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FRENCH OPERATIONS IN MADAGASCAR, 1883-1885.

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IN a former lecture¹ the development and progress of the Hóva nation were traced from their origin to the actual establishment of a military despotism over nearly the whole island of Madagascar.

Revival of Dormant French Claims.—This assumption of dominion over the entire country, and the consolidation of the supremacy exercised by the Government of the Hóva Queen over the less civilized Malagasy tribes, were latterly contested by the French Republic, which reclaimed certain long dormant rights over the north-west coast, in spite of the Treaty concluded in 1868 during the Empire, when Ranaválona II was acknowledged by Napoleon III as Queen of Madagascar.

Four years ago it was resolved by the Government of France to enforce these historic rights, which had certainly been often reaffirmed although never exercised by successive French Ministers; and accordingly Commandant (now Admiral) Le Timbre was instructed to enforce this resolution by cutting down the national flags erected at certain positions within easy access from Nòsy Bé.

These orders were duly carried out by M. le Timbre in 1882, whereupon an embassy was despatched to Europe from Imèrina to protest against such proceedings, at Paris, London, and other capitals. Nevertheless the French claims were pressed, and, as the Malagasy Government refused to yield, the Minister of Marine,² under M. Jules

¹ "Examples of Military Operations in Madagascar by Foreign Powers, and Native Campaigns, 1643-1881" ("Journal of the Royal United Service Institution," No. CXXXII, vol. xxix, 1885).

² The final instructions issued by M. Chas. Brun, the Minister for Marine, to Admiral Pierre, on the 17th March, were to the following effect:—

"You will destroy the posts established by the Hóvas on those parts of the coast under our protection or sovereignty, comprehending not only that part of the north-west coast to the north of Ibdina, but also the north-east coast as far as Antongil Bay. You will cause the evacuation of any posts existing in this region, notably that of Antsingy (Bay of Diego-Suarez). You will then make a demonstration along the north-west coast and in Antongil Bay to confirm the intention of the Republic to maintain its rights over the whole extent of their territory. (2.) You

Ferry's direction, instructed Admiral Pierre to bring the Hóvas to terms by force of arms, and the Admiral proceeded in the cruiser "Beautemps-Beaupré" to put the orders into execution.

The Cabinet of M. Ferry seems to have been badly informed as to the nature of the conflict now entered upon with such a light heart. It appears to have been taken for granted that either the Malagasy would at once have yielded to all the French demands at the first exhibition of strength by the French men-of-war, or, that failing, a leisurely advance of a few hundred men could be made on the capital, only some seventy odd miles from the east coast, when the Hóva Government would immediately have collapsed, and the great island have changed hands and become French territory.

Consequently the only provision made for eventualities was the assemblage of a small land force sufficient, as it was supposed, to hold possession of the two principal ports, Mojangà and Tamatave, after they had been taken by the naval division. For this purpose, therefore, three companies were made up at Réunion,¹ from the small garrison there, mobilized and held in readiness to embark; whilst half a company of marine infantry was despatched to Nòsy-Bé, which island afforded a convenient base of operations on the north-west coast. Here also a few ships' guns were mounted in the small fort for the better protection of the town of Hellville.

The fighting strength of the Hóva army was estimated by the late Mr. Cameron about this period at some 20,000 well-drilled troops, partly armed with breech-loaders, and a horde of some 50,000 spearmen.

30th April, 1883.—Admiral Pierre's squadron assembled off Hellville in Nòsy-Bé on the 30th April, and consisted of—

"Flore," cruiser (1st class)	20 guns, flag-ship.
"Forfait," "	15 5½-in., 6½-in. guns.
"Beautemps-Beaupré," cruiser (3rd class)	6 5½-in., 6½-in. guns.
"Vaudreuil," "	6 3½-in., 6½-in., 4-in. guns.
"Boursaint," aviso (1st class)	4 5½-in. guns.
"Pique," gunboat	3 5½-in. guns.

will possess yourself of the custom-house of Mojangà, and leave there a sufficient garrison from Nòsy-Bé as well as a ship. You will then promptly proceed with your squadron to Tamatave to act in concert with the Commissioner (M. Baudais). An ultimatum is to be sent to the Prime Minister, exacting: (1.) The effective recognition of the rights of sovereignty or protectorate which we possess on the north coast. (2.) The immediate guarantees necessary to secure the observation of the Treaty of 1868. (3.) The payment of indemnities due to French subjects.

"A term will be assigned to the Hóva Government, which will be warned that if its answer does not arrive within the date fixed upon, the Admiral will occupy the fort of Tamatave, seize the custom-house, and collect the duties until further orders. You will carry out, if occasion requires, the rigorous measures laid down in the summons."

Similar instructions were despatched by M. Challemel-Lacour to M. Baudais. (See "The True Story of the French Dispute in Madagascar," 1885, p. 112.)

¹ The headquarters of the French naval and military forces in the Indian Ocean are at Réunion, whose ordinary military establishment consists of four companies of marine infantry, one company of gendarmerie, and half a battery of artillery, in all some 550 men of the regular forces. From this garrison detachments are furnished to St. Marie and Nòsy-Bé as required. Hitherto there has been no garrison stationed at Mayotta. ("Les Colonies Françaises," Ministère de la Marine, 1883.)

7th May.—After embarking half a company of marine infantry, Admiral Pierre sent on the "Forfait" to Tamatave, and proceeded with the remainder of his squadron to Ampàsindàva Bay on the 7th May, where his vessels commenced hostilities—without any previous declaration of war—by destroying the Hóva posts at Ambòdimadiro, Ampàsimbitika.¹

At Anòrontsànga, on the west side of the Bavatòby peninsula, some slight show of resistance was encountered, but elsewhere the Hóvas retired inland on the approach of the French vessels.

On the 15th the Admiral arrived before Mojangà at the entrance of Bèmbatòka Bay. This place was defended by three forts containing thirty pieces of ordnance, all of which were old iron pieces of no value. At the time of the French attack it held a garrison, according to report, of 2,000 men.

Admiral Pierre at once summoned the Governor to surrender, but at nightfall received a derisive reply.

At daybreak on the 16th the ships opened fire from their moorings at 1,700 yards from the shore. The batteries replied with a few shots, but were speedily silenced, and at 8 A.M., the Hóva camp being in flames, the French ceased firing. The Hóvas lost 38 killed, and then retired towards Mèvatanàna before 11 P.M., when a large conflagration broke out at several points of the town and destroyed the Hóva quarter. A landing was effected the next morning under cover of the ships' guns, and the place occupied and placed in a state of defence. A detachment of marine infantry was landed and established a garrison under the command of Captain Gaillard of the "Vaudreuil," which vessel was left to assist in the defence of the post.

The remainder of the squadron then proceeded to Tamatave, where Admiral Pierre arrived on the 31st May.

The news of the destruction and occupation of Mojangà reached Antanànarivo on the 24th May, causing a panic. All French subjects resident in the interior provinces were ordered to leave the country, and were given five days to prepare for their departure, after which delay an escort and bearers were furnished by the Government to convey them safely to the coast. There is no doubt that had Admiral Pierre been able to land a strong column up the River Ikòpa immediately after the bombardment of Mojangà, a force of from 8,000 to 10,000 men could have marched through Vonizongo into Imèrina with comparative ease.

1st June.—On the 1st June an ultimatum was forwarded to the Hóva Government imposing certain conditions which were to be accepted by midnight on the 9th June, after which date, failing a satisfactory reply, Tamatave would be bombarded.

The three marine companies, made up from the Réunion garrison with some gunners, arrived now in the transport "Nièvre," and the

¹ *Vide* "French Operations in Madagascar, 1882-1886." Prepared in the Intelligence Branch, War Office, by Major W. S. Cooke, Cheshire Regiment. D.A.Q.M.G., February, 1886.

N.B.—Major Cooke's valuable compilation has been followed closely throughout in the lecture.

transport "Creuse" returning home with troops from Cochin was stopped at Tamatave¹ to assist in the operations.

At this time H.M.S. "Dryad,"² Commander Johnstone, was at Tamatave, and twenty marines were landed from her and placed as a guard to the Consulate under Lieutenant Knowles, R.N. The whole of the British subjects, excepting the Consulate staff and guard, embarked on board the "Dryad" and merchant ships in the roads, to the number of some 300, mostly coloured persons, only ten being Europeans.

10th June.—In the evening of the 9th the ultimatum was formally rejected, and the French Consul went on board the "Forfait." During the night the "Nièvre" shifted her position from among the other shipping, and anchored off the southern reef, half a mile away from Hastie Point, with a view to bringing a cross fire to bear on the fort.

At 6.30 A.M. on the 10th a signal shot was fired from the "Bour-saint," and a regular fire opened from the whole French squadron, viz., "Flore," "Forfait," "Beautemps-Beaupré," "Boursaint," "Creuse," and "Nièvre," commencing with the "Flore," each vessel firing a shot every two minutes for the first half hour. The belt of trees along the shore masked the fort, situated a little to the north of and apart from the town, and somewhat impeded the effect of the French fire. The *enceinte* consists of a thick wall of masonry surrounded by a strong earthwork, but had only a few old-fashioned guns, which were not even mounted.

From the ships little beyond the top of the flagstaff could be seen. The town was soon in flames, the work, as Captain Johnstone supposed, of incendiaries.

No reply was made by the fort, which was evacuated immediately after the commencement of the bombardment, the garrison, reported at about 500 men, armed with Sniders, retiring to an entrenched

¹ *Tamatave*.—In Admiral De Horsey's remarks on Tamatave (see "African Pilot," Part III), he writes:—

"There is a white sandy beach all along the shore which, however, shows best south of Tamatave.

"The anchorage is protected by a reef projecting half a mile to the north-east and eastward, and a quarter of a mile to the south of Point Hastie, and also by a detached reef to the N.N.E. of the one just mentioned, leaving a clear channel of about one-third of a mile with from 9 to 14 fathoms of water in it. There is deep water anchorage outside these reefs in case of being becalmed, but the bottom is rocky, and the ground swell frequently heavy. The anchorage is in from 11 to 3 fathoms, shoaling quickly as you approach the shore. In all ordinary weather it is safe and smooth, but in a hurricane or common gale it would be insecure, as the holding ground is not good, and a heavy swell would roll in.

"To the northward of the Point Tanisa (or Tanio) it runs off shoal, beyond which spit there is a good passage between it and the north reef.

"The town is large, probably containing 10,000 inhabitants. It is pretty well supplied with wells, but the water is of indifferent quality, and not convenient for watering ship. The landing place is quite smooth inside the south reef. Boats may, however, land all round the bay, as there is but little surf. The fort is situated about half a mile north-west of the spit, and has a small outwork, both concealed by the trees."

² The unfortunate friction between the French Admiral and the English Com-

camp situated about 3 miles inland, and named Manjakandrian-ombàna.

Till 8.15 firing was maintained at the rate of one shot every five minutes, after which it was slackened to one round every hour, and later continued at longer intervals throughout the day, being directed principally against the camp to which the Hóvas had retired.

11th June.—At daybreak on the 11th, under cover of the guns in the ships, a force of 600 men was landed, under command of Captain Billard, of the "Flore," and divided into three columns, advanced by the north beach, the main street of the town, and the outskirts of the village, on the fort, which was occupied in about half an hour without any opposition. Measures were at once taken to place the work in a proper state of defence.

12th June.—On the 12th the "Nièvre" and "Forfait" bombarded Ivondrona, a small village at the mouth of a river a few miles south of Tamatave, while the "Boursaint" and "Beautemps-Beaupré" bombarded Foule Point, Mahàmbo, and Fenòarivo to the north.

14th June.—On the 14th the refugees had returned to Tamatave from on board ship, and Admiral Pierre hoisted the French flag, proclaiming a state of siege, with Captain Billard, of the "Flore," as Commandant. The garrison and working parties from the squadron were busily employed in strengthening the defences of the place, mounting guns from the ships, and retaining a garrison of 400 men on shore, from which outposts were furnished for the protection of the town and peninsula. Access to Tamatave was denied to all foreign sailors, soldiers, and Officers.

26th June, 5th and 15th July.—Night attacks were made by the Hóvas on the French position at Tamatave, but though some bands succeeded in penetrating into the town, which they endeavoured to fire, they were on every occasion repulsed by the outposts with loss. The French reported their own loss at one killed and no wounded. Meanwhile they worked unremittingly at the strengthening their defences, and blockhouses were erected for the protection of the outposts and pickets.

The relative position of the opposing forces at Tamatave remained unchanged throughout the remainder of the war. The French, not having sufficient force to carry on operations inland, improved their lines of defence, while the Hóvas, on their side, continued to strengthen and enlarge their fortified position at Manjakandrian-ombàna.

"The French," writes Colonel Shervinton, "remained inactive with the exception of occasional reconnaissances from Tamatave and Mojangà. These skirmishes were good schoolings for the Hóvas, who grew bolder day by day, and at last took to laying ambushes, into which the French often fell; and there were many trophies, including rifles, a horse, mules, an ambulance cart, &c., which found their way

mander, and the incidents in connection therewith, need only a passing allusion. It is merely sufficient to state that the conduct of the Commander met with the fullest approval from the Admiralty, and Captain Johnstone obtained his post rank in acknowledgment of his services.

up to the capital. The Hóvas also succeeded in capturing several prisoners who were well cared for in the Malagasy camp."—(*MS. account of the late French campaign.*)

August.—In August four companies of marine infantry and a company of marine fusiliers (in all some 700 men) were ordered from France, and embarked in the "Creuse" and "Naiade," the latter being the new flag-ship, to replace the "Flore," ordered home; this reinforcement it was anticipated would enable the French to keep the Hóvas at a distance and prevent them from surrounding the town on the land side.

By the direction of Admiral Pierre a native auxiliary corps was ordered to be formed at Mojangà, of Sàkalàva and Ankàrana tribesmen, the subjects of Queen Benào and Tsialàna, the Chief of Nòsy Mitsio. Admiral Pierre was invalided home, leaving Captain Rallier in charge of the operations, and died on arrival at Marseilles, whilst in quarantine, 11th September.

September.—In September two companies of Créole volunteers were formed at Réunion, for service in Madagascar, but the enrolment progressed slowly, the service being distasteful, and the anticipated effective was never attained.

During September the British squadron, under Admiral Sir William Hewett, on the Mozambique coast, consisted of the following:—

"Euryalus," flag-ship; "Briton;" "Tourmaline," in relief of the "Dryad;" "Ranger;" "Osprey," screw sloop; "Dragon;" "Undine," schooner.

Difficulties arose with the local Malagasy authorities on the coast relative to the purchase of supplies, originating mainly from the inability of the inhabitants to distinguish between French and English war vessels, and from the harassing state of affairs produced by the French occupation.

Admiral Galiber hoisted his flag on board the "Naiade" at Tamatave on the 24th September, and the arrival of the new Commander-in-Chief, coupled with the departure of Captains Billard and Rallier, who had formed under Admiral Pierre a *régime* especially hostile to the British, soon led to the establishment of more amicable relations between the two European flags in the Indian Ocean.¹

October.—Negotiations were opened at Tamatave at the end of October, but no suspension of hostilities took place; and Commander Boutet proceeded with the "Boursaint" along the coast to the north, with instructions to do all the damage possible, which he carried out effectually by shelling various ports, as Foule Point, Mahàbo, Point Larée, Mananàra, Maròantsètra, and other places in Antongil Bay.

¹ Admiral Galiber established three posts to guard the peninsula of Tamatave, each consisting of a blockhouse, situated on an elevation, capable of holding twenty-five men in the basement and twenty-five in the story above. These posts were completely surrounded with palisades and ditches planted with prickly pear. Next to the cactus fence were planted pickets with wire entanglements. Outside these posts, at 100 metres beyond the first line, were abattis of timber, and at 200 metres beyond another line of abattis, the whole surrounded with fougasses and ground torpedoes, electrically connected with the interior of the blockhouses, the whole defence rendering the place impregnable to any enemy unprovided with guns.

On the 31st October the "Boursaint" opened fire on the town and custom-house at Vohimàro, where four natives were killed; then landing parties in two launches set fire to the houses not destroyed by the bombardment. The British subjects, Créoles and Indians, were taken to Tamatave.

On the 24th October the "Creuse" transport, with a company of 177 marine fusiliers, and the "Capricorne," a gunboat of light draught, arrived at Tamatave, and the former was fitted as a floating hospital. A considerable number of invalids were taken in the "Nièvre" to Réunion, where there is an excellent sanatorium at Salazie, for the French troops now began to suffer heavily from malarious fever.

These operations were followed on the 12th November by the bombardment of Mahanoro by the "Nièvre" and "Vaudreuil." The "Boursaint" and "Beautemps-Beaupré" proceeded about the same time to Port Choiseul, beyond the bar of which the Hóvas had constructed a series of barriers to obstruct the approach, but these failed to stop the French boats, and the village was taken and burnt, the only casualty on the French side being a Malagasy pilot wounded.

The "Vaudreuil" and "Nièvre" went down the coast to the south and bombarded Mahéla, Mananjàra, and Fort Dauphin.

On the 16th November an attempt was made by the Hóvas to carry off the Queen of the Sàkalàva from Mojangà, but was frustrated by the garrison, assisted by the fire of the gunboat "Pique" and a landing party from the "Forfait."

During the month of November two companies of Réunion volunteers arrived in Madagascar, and were distributed between Tamatave and Mojangà.

The French force on shore at this period is stated to have consisted of about 850 men, distributed as follows:—

TAMATAVE.	{	Marine infantry, 3 companies,
		Marine fusiliers, 1 company,
		Marine artillery, detachment, and 4 guns, ¹
		Réunion volunteers, 1 company,
		Landing companies from the Fleet.
MOJANGÀ.	{	Marine infantry, $\frac{1}{2}$ company,
		Réunion volunteers, 1 company,
		Sàkalava auxiliaries, 1 company.
ST. MARIE and NOSY-BÉ.		Marine infantry, $\frac{1}{2}$ company.

At Réunion were four companies of marine infantry, between whom and the troops in Madagascar frequent reliefs were carried out.

On the 31st December another attack on the French position at Mojangà was repulsed without difficulty by the "Pique" and "Forfait" in conjunction with the garrison.

3rd January, 1884.—Operations in 1884 were opened by the bombardment by the "Boursaint," on the 3rd of January, of a village beyond Tanio Point, immediately to the north of Tamatave.

9th January.—Lieutenant-Colonel Willoughby, an Officer who had

¹ Besides guns and machine-guns from the men-of-war.

raised and commanded a corps of irregular horse in the Zulu war, arrived at Antananarivo on the 9th January, and was appointed Adjutant-General of the Hóva Army. The French force was too numerically weak to undertake any expedition into the interior, either from Mojangà or Tamatave, but on the 14th January a reconnaissance was made by about 400 men in the direction of the Hóva lines outside Tamatave.

This column was accompanied by five mountain guns drawn by mules, and under cover of a fire opened by the ships at long range, penetrated as far as a marshy valley which borders the high ground beyond, on which the Hóva camp was entrenched.

In *February* a Credit Bill for the Madagascar Expedition passed the French Chamber and Senate, in which the strength of the naval and military force to be maintained in the Indian Ocean was fixed at eleven ships, with—

Officers, sailors, and marine fusiliers ..	2,224
Marine infantry and artillery	1,243
	<hr/>
Total	3,467

batòka Bay and the neighbouring bays; but this, he states, was insignificant, judging from its results, for, as he told the Committee, the commerce there is unimportant, all the foreign trade being in the hands of four or five English houses, one German, and two or three American firms established at Tamatave.

May.—In May Admiral Miot proclaimed a blockade of certain ports on the east coast, including Mâhandro and Fènoarivo, in consequence of which the principal outlet for native produce and inlet for foreign goods was shifted to Vatomandry.

Negotiations were again resumed and broken off in consequence of the French persisting in claims to possession of all North Madagascar beyond a line drawn from Cape Bellone to Cape St. Andrew.

28th June.—On the 28th June the French troops at Tamatave made a *reconnaissance en force* against the Hóva lines of Manjàkandrianombàna. The French force was reported to be 1,200 strong, with six field-guns and three mitrailleuses. The attack commenced at 6 A.M., but was met by a well-sustained fire from the Malagasy troops on the other side of the river, which prevented the passage, and the skirmishers fell back under cover of the guns. The Malagasy artillery, having the exact range, opened fire, and succeeded in silencing the French guns. After two hours the French retired. The Malagasy troops, who were said to be 10,000 strong, were commanded by General Willoughby, under whose lead they appear to have behaved admirably, and gained a complete success. They lost several men wounded, but no killed. The French admitted no loss on their side.

30th June.—On the 30th June another reconnaissance was made over the same ground, and an outpost south of the entrenched camp was attacked, but the French ultimately withdrew without pushing the assault home. The Hóva camp, surrounded by marshy and difficult ground, necessitating a circuitous line of approach, and strongly entrenched by the Malagasy, presented such difficulties to an attack, that Admiral Miot did not think his force sufficiently strong to carry it.

According to report, the Hóva works were extensive and scientifically constructed, armed with several field-guns and four or five machine-guns of their own manufacture. We have since learnt that ammunition was deficient to an alarming extent.

The French landed during July some 80 or 90 mules from Réunion, and a 5½-inch gun was mounted in the fort at Tamatave, which occasionally fired a few rounds into the Hóva camp.

Captain Laguerre, commanding the battalion of marine fusiliers, was in command of the troops on shore at Tamatave.

5th July, 1884.—The plain which environs Tamatave is in the shape of a trapezium, of which one face is formed by the sea, and the others by various river lines, which completely enclose it, viz.: (1) the Ivondrona, which flows into the sea 7 miles south of Tamatave, opposite the outlying Fong Islands, where there is an important village, Anjòlokèfa, the first stage towards Antanànarivo; (2) the Vòrina, an affluent of the Ivondrona; (3) the Sangàlatra, an affluent of the Vòrina; (4) the Tètezampasy, which flows into the

Ranomainty, which in its turn joins (5) the Ivolôina which flows into the sea 8 miles north of Tanio Point.

This trapezium may be about 10 miles long from north to south and 4 miles wide from east to west.

This plain is extremely diversified and broken, being covered in many places with trees and brushwood and intersected with several streams and lesser brooks. Next the sea face it is bordered with sand hills covered with pandanus and convolvulus, within which hills are numerous marshes some of which are of considerable depth. From a military point of view the ground is exceedingly difficult.

The Hôvas took up a well chosen position along the line of rivers above enumerated which they judiciously entrenched.

The camp of Manjakandrianombana is situated on a hill $4\frac{1}{2}$ miles in a straight line inland from Tamatave, and is strongly palisaded and provided with batteries. To the right and left on both sides of the covering river line they established other posts on well selected sites so as to completely close the plain; and thus the peninsula on which Tamatave stands was completely enveloped by lines of circumvallation.

Sâhamâfy is a point on the Sangàlatra, 4 miles to the south of Manjakandrianombana; and at this date, 5th July, Admiral Miot wrote:—

"Les Hôvas accumulent à Fàrafàtra des ouvrages en terre auxquels ils travaillent paisiblement depuis une année." . . . "Colonel Willoughby is among them with 5,000 men, it is said, and doubtless directs the construction of the redoubts which they raise at different points along their line. The situation which the Hôvas occupy on the hills of Fàrafàtra is not a mere rallying point (*rassemblement*), it is a line of frontier protected at each extremity by rivers of considerable depth, with its front covered by a series of marshes, streams, and rivers, which must be crossed in coming from Tamatave.

"The villages of the Bêtsimisaraka are established in rear of this line under the surveillance of the Hôvas. They it is who excavate the ditches, who do all the hard work and bring in provisions.

"Whenever we shall drive the Hôvas from this line, they will fall back on the hill-spurs behind them with the same villages and we shall have to occupy one or two principal points to prevent them from returning."

With regard to Mojangà,¹ at this time the Admiral wrote:—

"I think with you that it is important to occupy Mârovoây in Bèmbatôka Bay, but it is no use denying that the Hôvas have, like ourselves, appreciated the importance of this situation, which commands the route to Antananarivo, and there-

¹ "The point at the west of the entrance to Bèmbatôka Bay is 15 miles east from the west point of Bôina Bay. This bay is $3\frac{1}{2}$ miles across the entrance to Andrombatô, within which is Mojangà spit in $15^{\circ} 42' 54''$ lat., and $46^{\circ} 20'$ long. ($46^{\circ} 18' 34''$, Grandidier). Inside the bay extends 17 miles from the entrance to the mouth of the river Bêtsibôka, and measures nearly 8 miles across. About 6 miles in, the shores approach opposite a projection, Piripiriny Point, on which is the village of Nôsimbanàna and the ruins of the old town of Bèmbatôka. The western side of the bay is low near the sea, with hills rising inland, and skirted by reefs for $1\frac{1}{2}$ miles. The eastern side, between the two points, forms a hollow but shallow bay. In the centre is a deep and clear channel, trending about south-south-west (true), by which the anchorage south of the town is reached where a ship lies safe in from 4 to 8 fathoms.

fore it has been well fortified and garrisoned." He adds:—"We must destroy Märovoäy as well as Färafätra, but my stay there will be fatal to our men. The point to occupy will be Mëvatanäna, situated on an elevated plateau, perfectly healthy, on the other bank and almost opposite.

"At Märovoäy as at Färafätra the Hóvas were and are still commanded by Europeans; their number is very considerable, and we have given them all this time to make preparations for fighting us with a discipline of which they were incapable last year."

On the 3rd July, a grand review was held on Mähämäsina, the great parade ground at the capital, where from 20,000 to 30,000 regular troops, dressed in white tunics, dark blue cotton trousers, with brown helmets, and armed with breech-loading rifles, were drawn up and inspected by Rainilaiarivöny. The Queen rode down the line and great enthusiasm was displayed.

8th August.—On the 8th August Ambòdimadiro in Ampäsindäva Bay was occupied by the French, who landed from the "Chacal" and "Pique," gunboats, and a site chosen where a redoubt for a garrison of fifty-five men was thrown up. The Säkäläva in the neighbourhood were friendly.

22nd August.¹—On the 22nd August, Mähänöro was bombarded by

"Mojangä town is situate on the south side of a spit and is divided as usual on this coast into two portions. The upper is on a ridge surmounted by the palisaded fort and the residence of the Hóva governor. The lower town, joined to the former by a straight road, extends half a mile along the shore, with many houses of Indian construction of stone, sun-dried bricks, and cement, inhabited by Banians, British Indians, and Arab merchants. There are two mosques, one Arab and the other Indian. The Säkäläva huts are of slight build and are frequently burnt. Their number has been estimated at 1,600, and the population, including the Hóva garrison, may probably number 12,000. Formerly Mojangä was an important place, containing a large population of Arabs and others principally engaged in the slave-trade. Later the British Steam Navigation Company made Mojangä a port of call, but this communication has been broken off. At present the steamers of the Messageries Maritimes maintain regular communication between Mayotta and Mojangä. It is high water, full and change at 4h. 30m.; springs rise 16 feet. The tidal streams run strongly.

"The head of Bëmbatòka Bay expands into a wide basin into which the river Bëtsibòka flows. The tidal portion of this river extends 50 miles from the head of the Bay. In June 1876 the boats of H.M.SS. 'Thetis' and 'Flying Fish' ascended the Bëtsibòka for 100 miles. When beyond the influence of the tide a steady current of about two knots per hour was encountered."

¹ Mahämbö was declared blockaded from the 10th August, and Foule Point on 5th October.

Vätomändry, after the blockade was established by Admirals Galiber and Miot, gradually became of some importance as the port which remained open latest after the bombardment of Mähänöro in August 1884. Mähänöro, like Vätomändry, has only been used as a port by foreigners since Tamatave was occupied by the French, and both these places latterly have increased in size. The official residence of the Hóva governor is at Bëtsizaraina, about 6 miles inland up the river Säsaka. Should a railway be constructed from the capital and follow, as proposed, the line of the Mangöro, Mähänöro, which is 7 miles north of the mouth of the great river, will occupy a favourable position for a large depôt. 70 miles south of the Mangöro is Tànandäva, a Hóva fort within the southern limit of the province.

The inhabitants about Vätomändry belong to the Antëva clan of the Bëtsimi-säraka tribe. South of the river Manändry, in 19° 40' lat., the Antatsimo, a branch of the same tribe.

the "Allier." This was a place of some importance, since the occupation of Tamatave, forming a part of direct communication with the capital.

September.—The small garrison at Ambòdimadiro was repeatedly harassed by night *alerte*, and consequently it was increased to 100 men under Captain Pennequin.

October.—This Officer having ascertained the existence of a Hóva camp at Anjaibòry near Anòrontsànga, surprised it on the 18th October. On that date the Hóva camp was reached after a march of seven hours and attacked with complete success; out of the 400 men composing the garrison, the Hóva Commander was killed with fifteen of his men and some eighty were wounded, the survivors retiring to Ankàràmy, about 30 miles from the coast.

The French had only one man wounded.

About 100 rifles and a quantity of ammunition were captured. On the 30th October, Captain Pennequin made a reconnaissance towards Ankàràmy and another on the 14th November, but no signs of the enemy were met with.

The Hóvas were now closing round Mojangà in considerable force, so that the French were compelled to make constant patrols to clear their front. Nevertheless strong batteries were erected on the right bank of the river, and all tributaries leading into it were stockaded.¹

November.—Admiral Miot when reporting the above reconnaissance stated that the movements of the enemy were notable for the unusual regularity of their manœuvring, which was evidently directed by Europeans. The Admiral said it would require at least 2,000 regular troops to clear the vicinity of Mojangà at this date.

Towards the end of the year operations of considerable importance were carried out in the north of the island. Admiral Miot, who had visited the coast in September, was of opinion that with the resources at his disposal and the assistance he might expect from the Sàkalàva, the occupation of the northern districts should be attempted. As a preliminary measure the "Beautemps-Beaupré," the "Allier," and the "Scorff" conveyed a force to Diego-Suarez Bay,² and to Vòhimàro, both of which points were occupied without opposition.

¹ Colonel Shervinton's MS. account.

² The entrance to Diego-Suarez Bay, otherwise British Sound (native name Antòmboka), is in 12° 14' S. lat., 49° 24' E. long., and is about 1,200 yards in width. It has above 30 fathoms depth close to its south side, 24 fathoms in mid-channel, the water shoaling to the north to four and three fathoms near Clarence Island (Nòsy-Vòlana), which joins the main at low water. Three miles within the entrance is a conspicuous rock, and just within the inner south head is a small cove with a sandy beach (Espègle Cove), with good anchorage out of the tideway, which runs with force through the entrance. Within the sound runs up 8 or 10 miles into various arms, with from 20 to 5 fathoms nearly to their heads. Of these on the north the easternmost is Irish Bay or Baie du Tonnerre (native name Dòvotsa-vàratsa), opposite the entrance of which is Nòsy-Langòro or Ile de l'Aigrette, which commands the channel. West of this is English Bay or Baie des Cailloux Blancs (Dòvotsivàtofòtsy), divided from the former by Cape George. This last inlet is only separated from the west coast by the narrow neck of land before alluded to two and a half miles across. On the south side are yet more extensive inlets, viz., Scotch Bay or Baie des Français (Dòvobazàha), Welsh Pool, Port de la Nièvre,

A point in one of the spacious inlets of Diego-Suarez Bay was occupied by a detachment under Captain Caillet, and the "Creuse" anchored in the bay.

27th November.—The Fort of Ambòaniho, some 14 miles south of Vòhimàro, was occupied without resistance by a company of marine fusiliers, a company of marine infantry, and the sailors of the "Beautemps-Beaupré" and "Allier." The French force was here joined by 1,700 Ankàrana, who had marched across the island from the north-west coast, and it was resolved to attack the Hóva stronghold of Majàkatòmpo, an entrenched cantonment on the plateau of Àndrapàrany, 22 miles west of Ambòaniho, and this operation was successfully accomplished by Captain Escande.

5th December.—From Captain Brun's report it appears that Captain Escande left 27 men and 75 Ankàrana in garrison at Ambòaniho, and left that station at 1 A.M. on the 5th December, with the following force:—

5th Company Marine Fusiliers	121
21st Company Marine Infantry	90
Landing company, "Beautemps-Beaupré" ..	52
Artillery detachment (1-65-mm. gun)	7
Gendarmerie mounted	11
Total	281

Native auxiliaries, Ankàrana, (flint guns
and spears) 1,200

The plateau of Àndrapàrany forms a strong position of 650 feet

leading into the Cul-de-sac Gallois; whilst the westernmost bay under the hill called Dover Castle is Sepulchre Bay. A height named Windsor Castle appears to dominate over the hills on the isthmus, and thoroughly commands the land approach to the peninsula of Bòbaòmby. High water full and changes at four hours. Tides rise $9\frac{1}{2}$ feet. The scenery round is beautiful, and the country reputed healthy in comparison with the other coasts of the island, but it is thinly inhabited. The Hóva port is at Antòmboka, $12^{\circ} 16' 40''$ lat., $49^{\circ} 17' 49''$ long., and the Government fort at Ambòhimàrina, $12^{\circ} 24'$ lat., $49^{\circ} 24' 14''$ long., two hours' journey inland from Antòmboka.

About 27 miles to the south is the principal trading port to the north of Madagascar. Vòhimàro Bay is a fine sheet of water, shut in by a coral reef, with a narrow entrance from the south-east, safe for the largest ships with a fair wind. On the south side is the trading town Vòhimàrina, Ihàrana or Hiàrambazàha, in $13^{\circ} 23'$ S. lat., $50^{\circ} 0' 49''$ long. The anchorage is good, but during strong south-east winds the sea breaks across the entrance. Vòhimàro is a place for export of cattle, and contains about two hundred houses, many of which, however, are now empty. When ships arrive in the port for bullocks the Antankàrana flock in, with Hóvas from Ambòaniho, and the town is crowded until the departure of the vessels. Vòhimàro was bombarded in October, 1884, and on the 21st November taken possession of and occupied by the French.

Ambòaniho, the Hóva town and fort, is 8 miles south of Vòhimàro, and about 1 mile from the sea-coast in $13^{\circ} 29'$ lat., $49^{\circ} 58' 14''$ long., and situated on a slight eminence commanding an extensive valley, watered by two streams. The citadel consists of an enclosure palisaded in the usual manner, covering an acre of ground; within are the houses of the Governor, Staff, soldiers' huts, magazine, &c. A few guns are mounted at the entrances and corners of the *ròva*. The Hóva and native villages outside contain about a thousand inhabitants.

elevation, commanding the valley of the Fanàmba, protected on the east by a chain of wooded mountains, and on the north and west by steep slopes, intersected by ravines and obstructed by belts of wood, advantageous for ambuscades. A reconnaissance showed that the gun could not cross the stream without being dismounted, and after this was passed, a wild gorge had to be ascended at a slope of nearly 45°.

The Hóvas, who had sought to dispute the passage of the stream, were driven back and the ascent was commenced under the fire of the enemy's skirmishers.

By 2.50 P.M., while the gun and ammunition were being got over the stream, the infantry continued to advance, impeded by abattis, but the dead body of a Hóva and the wounded carried away by their comrades showed the effect of the French fire.

The 5th Company Marine Fusiliers first reached the crest of the ridge, followed by the sailors of the "Beautemps-Beaupré," while the marine infantry continued along the bottom of the ravine.

All the movements were methodically carried out by successive rushes and no casualties yet occurred.

Meanwhile the native contingent was ordered to make a *détour* by the west and effect a diversion on the enemy's flank.

By 4 P.M. the plateau was gained and its full extent ascertained. From north to south it stretches 3 miles with a depth from east to west of about 500 yards, being covered with pasturage sprinkled with patches of wood. The Hóva cantonment surrounded by a simple fence lay at the north-west end, and in its centre was the róva, or citadel, a stockaded redoubt. It was of rectangular form, 75 yards by 55 yards, with palisades formed of timbers 13 feet high, and from 6 inches to 8 inches thick, but not loopholed for musketry; four *tambours*, each armed with one gun, placed in the centre of each face of the stockade, afforded a flank defence; these "*tambours*" were provided with platforms for musketry fire, laid 8 feet above the gun *emplacements*. The Hóva cantonment was farther protected on the north and east by a deep, narrow ravine, constituting a natural ditch, all the more formidable from being imperceptible until close upon it.

In this ditch and on the edge, forming a kind of counterscarp, the enemy had posted his best troops, and two guns had been placed in position at either end.

At 4.30 P.M., after a short rest, the naval and military commanders having jointly decided on the plan of attack, the companies were reformed in attack formation, and the signal to advance was given.

The chain of skirmishers gained ground quickly, driving the enemy before it, and the enemy took up his position in the ravine, directing salvos of case from the four guns against the French.

The action was now general along the whole of the plateau on a front of about 3,300 yards, when the 65-mm. gun came into action at about 1,100 yards from the Hóva stockade and maintained a continuous fire.

On reaching to within 160 yards of the ravine the first line of

skirmishers under Lieutenant Bertrand was moved to the right so as to turn the ravine, and enfilade the defenders, whose fire was beginning to tell; and three of the French here fell wounded, one mortally.

Captain Bergeolle's company of the marine infantry followed Bertrand's, and the sailors were soon afterwards ordered to take the same direction; the gun was left in position with a weak escort of the gendarmerie, who were now dismounted and maintained an effective fire.

At 5 P.M. the movement on the right became developed and the line of skirmishers was deployed at right angles to the ravine, which they enfiladed with a heavy fire. The Hóvas now sought to climb the slope of the ravine with a view to regaining the stockade, but the greater number fell.

The decisive moment was at hand; the intervening interval of 50 yards was covered with a rush, and those Hóvas who still remained threw down their arms and endeavoured to escape along the high grass at the bottom of the ravine. None attempted to surrender and the ravine was strewn with their dead bodies.

The victory was complete. All the Hóva chiefs with their best men were killed; while the remainder, a disorganized mob, fled towards the west, as the southern road was guarded by Martel's detachment.

The Ankàrana who had hitherto kept at a distance now hurled themselves on the village and camp with yells and were with difficulty prevented from slaughtering the wounded. The 65-mm. gun now came up dragged by the gunners and Ankàrana auxiliaries, and with a few well-directed rounds completed the rout of the fugitives.

The fighting was over at 5.30, having lasted three hours. At 6.30 the left column, which had inflicted great loss on the fugitives, entered the village. The enemy may be said to have been almost annihilated; the plateau of Andrapàrany and the streets of the village of Manjàkatòmbo were strewn with over 800 dead bodies, including those of Rainimàrosabànina, 12vtra, who commanded, and his sons.

The Sàkalàva Chief Rafojà, a faithful ally of the Hóvas, was also killed. A large amount of booty, flocks of cattle, and five guns were captured.

After this successful engagement, Commandant Escande returned to Vòhimàro, leaving Ambòaniho occupied by a French detachment and 200 Ankàrana.

Wooden huts were erected at Vòhimàro and Ambòaniho for the European troops, but there was a considerable amount of malarious fever. These operations in the north of the island were regarded by the French Admiral as of considerable importance, resulting in the overthrow of the Hóva power in the province of Vòhimàrina.

Admiral Miot, writing on the 20th December, states:—

20th December.—“It results from this expedition that we are absolutely masters of the northern part of Madagascar, which extends from Cape Amber (lat. 12°) to the 14th degree S. latitude. The forces of the Hóvas in this district are annihilated; the fugitives wander without leaders, without clothes or provisions.

In short, the results of this day surpass all our hopes. The destruction of the Hóvas is complete in this province, and here for a long time we have nothing to fear. The military operations are consequently finished, and we proceed to occupy ourselves solely with the establishments.¹

"Have no anxiety about Fārafātra. All the fuss about it is inspired by personal interests, and at least it will be always easy to go there with the object of slaughtering the Hóvas, otherwise we shall gain there no advantages nor any military or political result.

"If the operations against Mārovoà and Mèvatanàna can be executed from August to October with a sufficient number of troops I believe that the Government of Imèrina will accept all our conditions. I estimate that to accomplish this it will need about 3,000 men; but have no illusion, the Hóvas will not make peace until they have been beaten wherever we meet them, and it is not with a thousand men, whose ranks are daily thinned by the fatigues of the campaign, that we shall obtain an important result. The distances and the transport are serious elements with which the severe climate must be taken into consideration."

Notwithstanding the success of the late operations no further attempts were made by the French to advance into the interior.

15th February.—On the 15th February, 1885, reinforcements for the volunteer battalion from Réunion reached Madagascar, raising their effective to four weak companies, and some gendarmes arrived at Tamatave, from which small detachments were sent to strengthen the detached posts at Diego-Suarez and Vohimàro.

On the 24th and 25th February a violent cyclone visited Tamatave, causing serious damage to the shipping.

During this period the health of the troops was reported fairly good, there being 5 per cent. sick afloat and from 10 to 12 per cent. on shore.

At this period Captain Pennequin visited the chiefs Mònja and Bènaò, in the neighbourhood of Bāvatòby, Ankify, and Sāmbirāno; and with their assistance succeeded in raising a company of 100 Sākalāva, which was put in training under European supervision.

Captain Pennequin also visited Androntsānga, and reconnoitred the river Bèràndra and the road towards Ankārana.

The occupation of Androntsānga was projected by Admiral Miot, but not effected, but Captain Pennequin ascended the valley of the

¹ Later the Admiral adds:—"From interrogation of a wounded Hóva Officer it appears that not more than 100 Hóva soldiers and 200 women and children escaped. Andrapārany was their last refuge in the province of Vohimàrina, and the fugitives were forced to flee into the forests without food, clothing, or ammunition. At Sambāva there are but thirty or forty soldiers, who must abandon the place when we show ourselves. At Ngòntsy (Cape East) there are only 100 men, who will do the same as those at Sambāva. At Maròantsètra (Antongil Bay) the last year's garrison has not been reinforced. In the north, near Diego-Suarez, I am assured that the Hóvas are badly supplied with arms. We are therefore absolutely masters of all this part of Madagascar, and if by next April you can send me 2,000 men I guarantee to drive them from Mārovoà. . . . Time alone will correct the defects in the manners and barbarism of the Tankàrana; but nevertheless I consider it a great result that a column of 1,700 Tankàrana should have crossed the country, and that I have received a visit from Tsiālāna here at Tamatave, who comes to pay homage to France. The Hóvas have disappeared, the Tankàrana have retaken the route from the west, and the Sākalāva will reoccupy by degrees their villages under the protection of our flag."

Sàmbiràno some 40 miles from the coast, and found the native population quiet with no trace of Hóvas.

The Hóvas, after the destruction of Manjàkatòmpo, concentrated at a point between Mändritsàra and Ambàtondrazàka, north of Lake Alaòtra.

General Willoughby formed a large camp of instruction near Ilàfy, about 3 miles north of Antanànarivo, comprising some 20,000 men.

March.—According to the estimate furnished by the Minister of Marine in March the force provided for the Madagascar expedition at this time consisted of—

Naval Force.—5 ships of the regular division of the Indian Ocean station, with 900 men; 13 other ships, including 7 transports with a battalion of marine fusiliers and 100 native sailors—2,250 men.

Military Force.—Marine infantry and artillery, 1,415 men; the volunteer battalion of Réunion, 625 men, and a disciplinary company of 240 men from the disciplinary dépôt at Oléron, making a total of 2,280 men.

The joint naval and military forces would thus furnish 4,530 men.

The expenses of the expedition are stated to have been at the rate of 40,000*l.* per month.

The disciplinary company and a draft of 300 marine infantry reached Madagascar at the end of April.

14th March.—Admiral Miot wrote on the 14th March ¹:—

"The Hóvas are collecting in strength, and fortify themselves near Mojangà. They have built a regular fort and constructed a strongly entrenched camp on the right bank above the river. There is no longer any doubt as to their leadership. It is certainly European Officers who advise them."

The following is the estimate of the distribution and force of the Hóvas outside Mojangà forwarded by the Admiral:—

¹ "It is impossible," writes Admiral Miot, "that the actual state of affairs which we keep up at Madagascar must not entail from year to year far larger development in our means of action. It is sufficient to recall the military situation which the Hóvas occupied in June, 1883, as compared with that which they occupy to-day. Should the year 1885 close without our having undertaken anything beyond what we now do it will be lamentable. The Hóvas organize themselves, drill and fortify themselves; they realize and maintain more than ever, in the eyes of the tribes over whom they rule, the fact of their dominant superiority, and show them that if they are not invincible they are at least unconquered. In ousting them from Fàràfàtra, Màrovàdy, and Ankàramy, I am persuaded that we need not march upon Antanà-rivo. The people, wearied out with the war, would impose peace on the Prime Minister. What is needed for this operation? 3,000 men more or less. In 1884, they have seen Vòhimàro, Diego-Suarez, and Ampàsindàva fall into our power. We cannot hesitate, and however onerous may be the duties which our honour imposes they must be accomplished by the undertaking of active measures. According to my advice, we must act towards September on the east coast and at the end of June on the west coast. The means at my disposal for this purpose are absolutely insufficient. I shall confine myself to guarding the posts already occupied; but a large proportion of the troops is weakened by the bad season, and requires reinforcements."

	Men.
At Andrèkitza and outposts.....	900
At 20 minutes from Andrèkitza.....	800
At the head of the bay of Mojangà (post of observation)	200
At 20 minutes further at Betsakòana.....	800
At the camp of Ramàmba. Commander-in-Chief	9,000
Beyond at Ambàtolafia.....	160
At Mòraràmana	125
Distributed along the right bank of the river, about	120
Besides, at Mòrovoà	1,000

Total, about..... 13,105

Of these there are at the advanced posts before Mojangà, 2,500 (at about 8 kilometres).

I put down 2,000 as servants or slaves, there will remain a force of about 10,000 men with whom we must deal, the best soldiers of Imèrina. They have breech-loading field-pieces.

"Mòrovoà," writes Colonel Shervinton, "was made impregnable to assault, and, although the French gunboats frequently bombarded it, no damage was done, the garrison being safe in their bombproof galleries. This post was situated about 20 miles from Mojangà, and three of its sides were surrounded by swamps; indeed, a landing from the river would have been accompanied with heavy loss, as the banks were composed of deep soft mud and well swept by the fire of the town, whilst the firm ground between the river and the town was one mass of rifle-pits. A small tributary almost encircled the hill, forming a natural fosse, and the sides of the hill were scarped to a height of 35 feet from its crest."—(*MS. account.*)

March.—The health of the French soldiers was reported as very bad in March, the sick rate at Tamatave being as high as 50 per cent. The sick were collected from the different parts of the island and conveyed to Réunion for transhipment to France.

April.—Early in April a small detachment of forty men from the "Creuse," lying in Diego-Suarez Bay, proceeded inland some distance on a foraging expedition under Midshipman Crova, and was surprised by a band of Hóvas on its return. M. Crova was slightly wounded, but the party effected its retreat in safety under Dr. Ferrand.

21st May.—On the 21st May an attack on Mojangà was repulsed with a loss to the Hóvas of six men.

At the end of May 1,000 men were selected, and after being medically inspected and carefully equipped were despatched by easy marches to the north-west to commence operations against the French at Ambòdimadiro and the neighbouring Sàkalàva. This expedition left Antànànarivo on the 1st June.

June.—In June negotiations were reopened by MM. Baudais and Miot through the mediation of the Italian Consul, Sr. Maigrot, but M. Baudais's insistence on the French protectorate prevented any satisfactory conclusion being arrived at. M. Baudais's acceptance of Sr. Maigrot's mediation was unauthorized by the French Government, who disavowed the proceedings and recalled their Commissioner.

July.—A battalion of marines reached Tamatave from France at the end of July, and a mountain battery and a company of marines.

August.—Infantry from Tonkin arrived at the beginning of August. Urgent requests were sent by Admiral Miot for more reinforcements and more surgeons, for the health of the force was so bad that at Vòhimàro (supposed hitherto to be comparatively a healthy station) there were said to be 80 per cent. of sick.

August.—Towards the end of August the two gunboats, "Tirailleuse" and "Redoute," made their way up the Bètsibòka River, passing by night an entrenched camp of the Hóvas, Ramàmba, and arrived within 2 miles of Màrovoà. The Hóvas opened fire upon the gunboats with rifled guns, to which the boats replied with their 10-cm. guns, and afterwards with their Hotchkiss guns, and succeeded in silencing the enemy's fire, and dispersing the defenders with some loss.

The Hóva expedition which left the capital for the north-west under Andriantsilavo's (nominal) command (Colonel Shervinton, who accompanied the force, in reality directed the operations), was moved towards Ampàsindàva Bay, arriving at Ankàramy on the 14th August.¹ As the Sakalàva Chief of Jangòà was in alliance with the French, it was resolved to chastise him, and on arriving within 50 miles of that place, a road was cut through the forest a distance of some 40 miles, a task which occupied three days and a half. At midnight on the 26th August, the column debouched from the woods on a plain within 8 miles of Jangòà, and before daylight it was surrounded, sacked, and burnt. Bush fighting continued all the morning, but the inhabitants mostly escaped by the river, and but few were killed and few prisoners taken.

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Battle of Andàmpy or Bèfitina.—The French at Ambòdimadiro, hearing of the capture of Jangòà, came out prepared to attack the Hóva force, which had been strengthened by 400 men from the Ankàramy division. Including bearers and camp followers there were about 3,000 in all of the Malagasy.

The latter also pushed northwards in the direction of Ambòdimadiro, and three days after the capture of Jangòà the armies met at a place called Bèfitina.

The French had 250 of their own troops who were seen coming over some

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On the morning of the 26th August a stampede of Sakalàva reported the enemy to have invaded the valley of the Jangòà, where they were massacring the natives and firing the villages.

Captain Pennequin at once made arrangements to attack, and at noon the native company (70 men) took the direction of Jangòà, followed two hours later by a French detachment of 50 men; 40 men being left behind in charge of the fort at Ambòdimadiro.

Jangòà was found in flames, and the Hóvas had crossed into the Sàmbirano valley, but it was ascertained from the Sakalàva that the enemy were in position at a place named Andàmpy, about 2 miles from Jangòà, and Captain Penne-

¹ "The force had marched slowly, as the object was to bring the men up in good health and spirits and run no risk of fever. Owing to the care taken of the men the expedition only lost three of its number from fever during the four months it was away from Imèrina."—(MS. account.)

HÓVA VERSION.

rising ground early in the morning of the 27th August.

They had their machine-guns, and the Hóvas were furnished with two Hotchkiss guns.

At a distance of about 650 yards the two bodies halted and commenced firing. Almost at the first discharge of the Hotchkiss guns the French sergeant was shot, his head being nearly severed from his body.

The French kept up rapid firing, but their machine-guns were very badly managed.

While this was going on, an army of Sakalava appeared on the Hóva right wing, armed with double-barrel shot guns and old arms supplied by the French. The Hóvas, although surprised, had little difficulty in putting these Sakalava to flight.

Then would have been the time for the French to have advanced, it might have inspired vigour into their Sakalava allies, but they stood looking on whilst the Hóvas inflicted a defeat on them.

Meantime a number of Hóvas worked round the right flank of the French, and seeing that the French had missed their only chance of success, they fired two volleys, and 200 of them with cheers rushed on to the hesitating French. The Hóvas were quite down upon them before the French were aware of it, and after a desultory and very short fight at resistance, they broke ranks and fled promiscuously.

A French Officer stood to his guns, and directed them persistently on any attempt to capture them.

The Hóvas then pursued the flying enemy for several miles down to the river side and cut them down.

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quin decided to move forward on the 27th, and at 8 A.M. gained contact with the Hóvas.

The Hóva position was admirably chosen on the scarped sides of the Andampy hill flanking the Sâmbirano valley. Placing himself between the enemy and the river, intending if necessary to withdraw down stream, where the population was friendly, and supplies had been already directed by sea, Captain Pennequin opened the fight by a few volleys, which were answered by two guns and a well-sustained musketry fire. The extent of the Hóva position was soon ascertained; it covered about 1,100 yards of front, and was occupied in a methodical form by skirmishers, supports, and reserves, the guns being posted under escort on the extreme right.

The Hóvas swept the ground with a hail of bullets, but the French being dispersed behind thick cover afforded by fallen trees in a burnt wood suffered little. The enemy's fire was gradually subdued, and a small party creeping up to within 900 yards of the guns succeeded in silencing them, and they were withdrawn.

The strength of the Hóva position separated it from the French column by an intervening steep ravine, which made it unassailable in front and on the right flank; on the left, however, the ground was more favourable, and Captain Pennequin withdrew his men gradually towards this flank.

While this movement was being carried out under cover of an intermittent fire, the Hóvas, probably under the impression that the French were retiring, rushed down with loud shouts from their position.

Captain Pennequin formed his men into square on a mound overlooking a dip in the ground, and just within the border of a wood, which enabled him to watch the enemy, while his own movements were concealed.

Hidden away in thick brushwood they silently awaited the onslaught of the Hóvas with fixed bayonets.

The foremost bands were met with a volley at ten to twenty paces from the front face, and subsequent attacks on

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It was estimated that more than 100 out of the 250 were missing, and the next morning the bay was covered with boats picking up the fugitives.

The Hóva loss was eight killed and fourteen wounded. The French were said to have lost 100 in killed and wounded. The result was that Mònja, the Sàkalava king, sent in his submission to the Queen of Madagascar.

September.—Just a fortnight after the French disaster at Andàmpy Admiral Miot decided to make a vigorous attack on the Hóva lines outside Tamatave; but the projected attack was too openly discussed previously, and it is said that the Hóvas, who numbered over 21,000 men, were fully aware of the date fixed for the intended assault.

September 10th, Battle of Sàhamàfy.

On the morning of September 10th, at 6.30 A.M., the French heavy guns on the fort at Tamatave and on the ships in the harbour opened fire on the Hóva lines, so as to cover the advance of their troops. This firing continued without intermission for two hours, and nearly 700 shells were sent into the camp, which were counted at headquarters.

At about 8 A.M., 2,000 of the French troops threatened to make a front attack, but then wheeled towards the south opposite one of the Hóva works at

FRENCH VERSION.

the flank faces were similarly repelled with great slaughter. A final effort by a general rush from all points at once, drums beating, &c., met with no greater success, and the enemy fled in all directions, followed up by the French fire.

Immediately around the square were found forty-eight bodies.

The French loss was one sergeant killed and fourteen (of all ranks) wounded. Of these the sergeant was killed and fourteen wounded in the earlier phase of the fight. A general pursuit was not possible. The fight had lasted three to eight hours, and besides being exhausted and deficient in ammunition, the French column was numerically too weak.

The French force at Tamatave was formed in two columns of unequal size. The main division, 1,300 men, under Lieutenant-Colonel Romouil, Marine Infantry, was composed of Marine Infantry, Réunion Volunteers, Marine Fusiliers, Marine Artillery, and a train of Malagasy coolies under European direction.

The second division consisted of landing parties from the "Naiade" and "Nielly," under Captain Leeuve, in all 200 men.¹

Admiral Miot's plan was to seize Sàhamàfy, when little resistance was anticipated, to secure the bridge of boats near this village, find a ford known to exist, cross the Sangàlatra, carry the village on the Hóva right rear, and from that point take the camp in reverse.

The troops were in excellent spirits. The principal column advanced slowly at 4.45 A.M., preceded by fifteen gendarmes mounted, taking a south-westerly direction towards Sàhamàfy; whilst the smaller column made a diversion towards the north.

The first column was followed by a battery of artillery, and a small bridge-train, with a long string of mules with food and ammunition.

¹ The "Naiade," "Nielly," "Bisson," and "Correze," were in the harbour, and covered the advance with their fire.

HÓVA VERSION.

Sàhamàfy, which was made the object of the principal attack.

At the same time 200 men were despatched to attack the Hóva posts to the north, with the object of preventing the Hóvas from concentrating their forces. Fighting lasted till 3 P.M., when the French retired with a heavy loss of killed and wounded.

The Hóvas behaved very well, cheering and dashing into close quarters with the French.

The return march to Tamatave was almost a rout; the troops straggling in anyhow, quite exhausted and many of them without arms.

A column had been told off to harass them, but owing to the negligence or culpability of the Officer commanding it, nothing was effected.

The Hóva army consisted of about 7,000 men and 15 guns. There were 1,000 men holding Sàhamàfy.

A French flag fell into the hands of the Hóvas.

A few days afterwards General Wilmoughby made a night attack on Tamatave, with the object of making the French believe that he had plenty of ammunition; whereas had the French renewed their attack the Hóva ammunition would have run short.

FRENCH VERSION.

At 9 A.M. the first contact with the enemy was gained. The scouts pressed on, but in front and on the right the enemy opened a steady, well-directed infantry fire, supported by a few rounds from field-guns. It became necessary to halt and close up. At the end of the path, at about 750 yards distance, appeared the palisades and huts of Sàhamàfy; to the right and on the other side of the Sangálatra, at 550 yards, was a palisaded redoubt, the existence of which had not been suspected previously.

About 9.30 A.M. the scouts dismounted and commenced firing till the advanced guard came up. The ground towards Sàhamàfy was covered with thick brushwood, but had been cleared near the redoubt. The existence of a stream in front of the latter was inferred from the high grass gleaming in the sun. The ford was probably there.

The infantry came up and opened a heavy fire on the work, which replied vigorously, and the French soon had nineteen men *hors de combat*. The battery of artillery was now advanced, and came into action at 550 yards range from the work, the enemy replying with a volley to each shot.

The artillery sustained severe losses; a sergeant-major was killed, a Lieutenant and Captain were wounded, the former mortally. The gunners behaved with admirable bravery, and continued to work their guns under a galling fire.

Admiral Miot now determined to fall back, and the retreat was carried out in good order, and but slightly harassed by the enemy. The second column had successfully accomplished its task, having met with but few of the enemy, and driven them across the Rànomainty without any casualties.

The French loss was 2 men killed, and 32 wounded, including 5 Officers; 3 of the wounded, including 1 Officer, subsequently died of their wounds.

Sàhamàfy.—The attack resulted, unquestionably, in a complete repulse for the French. Admiral Miot was said to have shown great personal bravery, but his dispositions for the attack were severely criticized, especially the bringing a battery into action at so short a range from the enemy's works.

Distribution of the French Force in September.—At this time the

distribution of the French troops in Madagascar appears to have been as follows:—

<i>Mojangà</i>	{ Marine infantry, 2½ companies, Marine fusiliers, 1½ " " Disciplinary company, ½ company, Réunion volunteers, 1 company, Ankàrana auxiliaries, 1 company.
<i>Ambòdimadrò</i> ...	{ Marine infantry, 1 company, Sakalava contingent, 1 company.
<i>Nosy-Bé</i>	{ Disciplinary company, ½ company.
<i>Diego-Suarez</i>	{ Marine infantry, ½ company.
<i>Vohimàro and Ambàniko</i>	{ Marine infantry, 1 company, Réunion volunteers, 1 company, Ankàrana auxiliaries, 1 company.
<i>St. Marie</i>	{ Disciplinary company, ½ company.
<i>Tamatave</i>	{ Marine infantry, 6 companies, Marine fusiliers, headquarters battalion, ¹ Marine artillery, 2 batteries, Réunion volunteers, 2 companies, Gendarmerie, detachment.

M. Baudais, the French Commissioner, having been recalled, M. Patrimoine, the French Consul-General at Beyrout, was associated with Admiral Miot as Plenipotentiary, and after some preliminary *pourparlers*, peace was finally concluded, and a Treaty signed on board the "Naiade" on the 17th December, and ratified on board the flagship by General Digby Willoughby on the 10th January, 1886, and by the French on March 17th, 1886. The word *Protectorate* was expressly kept out of the Treaty.

The clause of the Treaty which most affects British naval and military interests in the Indian Ocean is Art. XV.

"Nevertheless, the Government of the Republic reserves to itself the right to occupy the Bay of Diego-Suarez, and there to form establishments at its convenience."²

The zone round the bay thus reserved by (not ceded to) the French is limited so as not to extend beyond 1½ miles (geographical) south, west, and east, and 4 miles north, reckoning from the deepest inlet of the bay.

It will be seen from the accompanying map that, although it is stated that the Hóvas must necessarily abandon the remaining moiety of the peninsula of Bòbaòmby, as far as Cape Amber, the Hóvas can still by right maintain a passage along the Windsor Castle isthmus to the valuable ports of Robinson, Jenkinson, and Liverpool.

The battalion of Réunion volunteers sailed for St. Denis on the 17th January, and was at once disbanded.

¹ The battalion of marine fusiliers was now ordered home. It had suffered severely during its two and a half years' service in Tonkin and Madagascar, and was reduced to a skeleton. Leaving Tamatave in the "Orne" on September 24th, it is reported to have disembarked at Toulon only 113 strong out of its original effective of 600. The "Orne" had brought out a draft for the disciplinary company.

² "Toutefois le Gouvernement de la République se réserve le droit d'occuper la baie de Diégo-Suarez et d'y faire des installations à sa convenance." (Documents Diplomatiques, Affaires de Madagascar, 1884-86, p. 177.)

The French force to be retained in Madagascar for the present, until the indemnity shall have been paid, is fixed at 6 companies of marine infantry, each of 3 Officers and 100 men, which will furnish the Resident's escort at Antanànarivo, the garrison of Diego-Suarez Bay, and the garrison of Tamatave. The squadron and the remainder of the force recently employed has been broken up, the position at Mojangà evacuated, and the Réunion garrison left at 4 companies of marine infantry, of the same strength as those in Madagascar, with which they will be interchanged for relief.

The result of the war has been that the consolidated Hóva power has become a recognized factor in the military conditions which affect the shores of the Indian Ocean.¹

ROUTES.

ROUTE No. 1.—(a.) TAMATAVE AND ANTANÀNARIVO.

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
BÊTSIMISÂRAKA. <i>Tamatave</i> , 18° 10' 6'' S. lat., 49° 28' 30'' E. long.	<i>First day's march, Tamatave to Trànômàro.</i> From Tamatave the line of the east coast is followed southward. The coast-line is very straight, and, as a rule, for 3½ miles inland, it consists of a bed of sand, thrown up by the rough surf produced by the prevailing south-east winds; hence the absence of harbours and the dangerous open roadsteads which prevent easy communication by sea along the coast. This long line of sand-bank has formed bars across the numerous mouths of the rivers which drain the eastern watershed some 60 miles inland, and this has caused the formation of a series of coast-lakes or lagoons extending about 400 miles in length, and here and there communicating with the sea. Thus a line of inland water communication is formed along which boats can travel, the intervals over which they must pass by land being few and unimportant. The track generally taken is along these sandbanks between the sea and the lagoon.
Carried forward.	

¹ For further and more detailed information and maps see "Madagascar: an Historical and Descriptive Account of the Island and its Dependencies," by Captain Oliver, 2 vols., each 560 pp. Published by Macmillan and Co., 1886.

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
TAMATAVE.			<p><i>First day's march—continued.</i></p> <p>Leaving Tamatave, the track leads over a sandy plain presenting occasionally long lines of sandbanks running parallel with the ocean, and passing through patches of wood, of <i>Casuarina</i>, various palms, and <i>Pandanus</i>. Afterwards the country is more wooded, until in two hours Anjòlokafa is reached, a straggling village on the banks of the Ivòndrona, 9 miles from Tamatave, on a tongue of land between the sea and river. A long halt is here necessary for embarkation in canoes made out of a single tree (generally <i>Inophyllum</i>), some very large, with bottoms as round as a barrel. They are from 30 to 40 feet long, and 4 feet in breadth and depth. After a short journey by water a landing is effected on the east side of Lake Nòsy-Vé, and the journey is continued from Kanomany past Ambòdinsiny (famous for the remains of an old jar of large dimensions to which superstitious veneration attaches), through clumps of trees, grassy undulations, <i>Pandanus</i>, and bushes growing in sandy soil, and remains of dead forest trees. Ground near the lake marshy; the best travelling on margin of the shore of the ocean. All this is a country permeated with miasma during the wet season.</p> <p>Three hours from the Ivòndrona river the small village of Ambàlatambaka is reached, but few supplies are obtainable, and it is as well to push on to Trànòmàro, where rice is (or used to be) obtainable, as well as manioc for the bearers. At Trànòmàro there are only two dozen houses—no supplies.</p> <p><i>N.B.</i>—The distance measured on map from Tamatave to Trànòmàro (nautical survey and Dr. Mullens's map) is 27 statute miles. At about 4 miles distant out at sea along this coast are dangerous reefs, the larger named Fòng Islands.</p>
Brought forward...	..	..
Anjòlokafa.....	9	..	
River Ivòndrona ....	..	..
Halt. Embarkation ..	..	..
Lake Nòsy-Vé	2	..	
Landing. Kanomany	..	..
Ambòdinsiny, lit.,	..	..
"at the bottom of the water-pot."			
Ambàlatambaka.....	10	..	
(Anavariana.)			
Trànòmàro	9	..	<p><i>Second day's march, Trànòmàro to Vavòny.</i></p> <p>The track still keeps southward, skirting the seashore, with rich vegetation on both sides of the lagoon, and extending to the</p>
Day's journey		30	
BÈTSIMISÀRAKA.			
Carried forward....	..	30	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
BÊTSIMISÀRAKA.			<i>Second day's march—continued.</i>
Brought forward...	..	30	high-water mark of the coast-line. Pass
<i>Si anak angaitra</i> ....	..	..	<i>Si anak angaitra</i> , a few huts. Plenty of
			cattle are met with, herds on their way
			from the interior to the coast for embar-
			kation at Tamatave, and kraals for herd-
			ing them are frequent.
<i>Tànifòtsy</i> .....	..	..	Turning out of the forest at <i>Tànifòtsy</i> and
<i>Ampàniràno</i> .....	..	..	crossing an outlet to the sea, <i>Ampàniràno</i>
			is reached, a village on the shore of Lake
<i>Lake Ampàndranity</i> ..	..	..	<i>Ampàndranity</i> , whence the road lies be-
<i>Lake Alopiana</i> .....	..	..	tween another narrow lagoon, Lake <i>Alopi-</i>
			<i>ana</i> . These so-called lakes are only differ-
			ent names given to so many reaches or
			widenings of the narrow lagoon, which
			is almost continuous. At some 8 or 9
			miles a collection of wretched cottages
<i>Andrànonkòditra</i>	8	..	(<i>Andrànonkòditra</i>), on a high bank of
			sand, is reached. (Ellis puts <i>Andrà-</i>
			<i>onkòditra</i> at 18 miles from <i>Tranomàro</i> ?)
<i>Manaôka</i> .....	..	..	Opposite, across Lake <i>Irangy</i> , is <i>Manaôka</i> ,
<i>Lake Irangy</i> .....	..	..	a Government station with <i>lapa</i> and flag-
(<i>Ampàribé</i>)			staff, &c. Thick <i>Pandanus</i> groves are
<i>Atàkalàmpona</i> .....	..	..	traversed as far as <i>Atàkalàmpona</i> , and
(<i>Ambanadrakit</i> .)			thick woods along the banks of Lake
(<i>River Andrànopàn-</i>			<i>Irangy</i> , in which are plenty of lemurs,
<i>drana</i> .)			till the hamlet of <i>Pantomàizina</i> is reached.
(<i>Lake Antobe</i> .)			Sago palms are now noticeable. Still
<i>Pantomàizina</i>	6	..	lagoon, marsh, wood, and sandbanks
<i>Lake Andràsoamàsa</i> ..	..	..	alternate, until, marching along the outer
(<i>Lake Rasòbé</i>.)	..	..	bank of Lakes <i>Andràsoamàsa</i> and <i>Rasòbé</i> ,
<i>Vavòny</i>	9	..	the Government port of <i>Vavòny</i> is arrived
			at on the western side of the lake. A
			black shining micaceous sand is here col-
			lected and used as blotting-paper at the
			capital (or was used so formerly).
Day's journey		23	<i>Tranomàro</i> to <i>Vavòny</i> measured on map as
Total .....	..	53	the crow flies is 15 miles. Total distance
			from Tamatave, 42 miles.
BETÀNIMÈNA.			<i>Third day's march, Vavòny to Andèvorànty.</i>
<i>Lake Imoàsa</i> .....	..	..	From <i>Vavòny</i> a boat voyage is practicable
(<i>Ambila</i> .)			along a reach named Lake <i>Imoàsa</i> , but it
			is usual for the bearers to take the bag-
			gage by land. There is an opening from
			the lake to the sea at 6 miles; and at
<i>Andàvakamènaràna</i> ..	10	..	10 miles, either by land or water, the small
			hamlet of <i>Andàvakamènaràna</i> . The nature
			of all the country along these lagoons
Carried forward...	10	53	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
BETÀNIMÈNA.			<i>Third day's march—continued.</i>
Brought forward ..	10	53	is slightly diversified by wooded or partially cleared undulating soil of sand and <i>débris</i> . More lagoon, which opens out into a broad and irregular estuary, Lake Rànomainty, at the mouth of the Ihàroka river (put down in Admiralty chart as the river Jark). On the spit of sand, an elevated portion of the river bar, is the village and Government station.
Lake Rànomainty ....	..	..	Vavôny to Andèvorànty as the crow flies is 14 miles.
River Ihàroka or Jark			<i>Andèvorànty</i> , 18° 56' lat., 49° 9' 50'' long.
<i>Andèvorànty</i>	9	..	
Day's journey.....		19	
Total .....	..	72	
			<i>Fourth day's march, Andèvorànty to Rànomafàna.</i>
<i>River Ihàroka</i> .....	..	..	The track, which has hitherto been south by west, closely following the line of the sea-coast, now turns abruptly almost at right angles away from the shore, and heads inland nearly due west in the direction of the capital. It is necessary to proceed in canoes up the river Ihàroka, which is here about 200 yards wide, with a current about 3 miles an hour. In the rainy season a large volume of water must flow down at a much greater speed. The banks are flat for the first 2 or 3 miles when they are found steeper, and after two hours' journey the roots of the first hills are reached, and the river contracts to 100 yards with a stronger stream, and becomes winding as higher levels are reached.
(Màrovàta.)			Several small villages are passed on the right on south bank of the river, and at 6 miles the main river is left, and the canoes turn up into a smaller stream south-west, with a current of 4 miles an hour. Hence it takes four hours to paddle up to a small village, Maròny, having passed by Ambòhibohàzo, a considerable place and a Government station. Tobacco, sugar-cane.
(Batrasina.)			Landing at Maròny, where some coffee plantations exist, the inland journey commences, and a totally different country is traversed—the change of vegetation and soil being very apparent, whilst, instead of easy marching over almost level sand
(Tànimàndry.)			
(Màramandà.)			
Junction of stream with river.	6	..	
<i>Maròny</i>	4	..	
<i>Ambòhibohàzo</i> .....	..	..
Land at <i>Maròny</i> ....	..	..
Carried forward....	10	72	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
BETÀNIMÈNA.			<p><i>Fourth day's march—continued.</i> and firm turf, there is now a series of clay hills intersected by small streams with marsh and swamps between. The <i>ravinàle</i> (<i>Urania</i>), bamboo, and the <i>rofia</i> palm (<i>Sagus rofia</i>) abound. The country is desolate and little inhabited. Rice is generally cultivated in this district. The country rises gradually, till at about 150 feet elevation the village of Mānambōnitra stands, well situated, with patches of sugar-cane, banana trees, tobacco, and rice grounds interspersed where not cultivated with <i>Erythrinus</i> (cock and hen or Cape Coral trees) and candle-nut trees (<i>Aleurites</i>). Another 6 miles through similar country, always rising, until at an elevation of 245 feet, after passing several clear streams with tropical vegetation, the hot springs and village of Rānomafāna are found.</p>
Brought forward ..	10	72	
Mānambōnitra	6	..	
Hot springs	6	..	
Rānomafāna.....	..	..
("Hot water.")			<p>Distance direct of Rānomafāna from Andēvorānty by map 11 miles.</p> <p><i>Fifth day's march, Rānomafāna to Ampāsimbé.</i></p>
Day's journey		22	
Total .....	..	94
Ambā'oharānana.....	5	..	<p>Leaving Rānomafāna, the country traversed has many beauties, and amidst a fine amphitheatre of hills there rise several lofty cones. The streams, of which several are crossed, run deep and strong over beds of quartz pebbles. The traveller's tree grows in enormous numbers, and large patches of rich black soil appear amidst the general masses of red clay.</p>
River Fārimbōngy ..	..	..
Carried forward....	5	94	<p>The course of the track is very tortuous and follows pretty nearly the course of the Fārimbōngy, whose waters present a succession of deep pools, cascades, and small rapids. The track ascends and descends over most slippery and steep ground, until after three hours Ambātoerāna (595 feet elevation) is arrived at, and after similar travelling Mahēla is reached, on a stream, either the Fārimbōngy or a smaller tributary of it; all the waters which are so often crossed and recrossed finding their way into the Ihārōka, in a broad and rapid stream. West of Ambātoerāna, and as-</p>

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
BETÀNIMÈNA.			<i>Fifth day's march—continued.</i>
Brought forward...	5	94	ending a spur of the confronting ridge up to an elevation of at least 1,000 feet, a good view is obtained to the eastward back to Andèvorànty, and the site offers a favourable signalling station. Its name is Ianlankova ("the weeping place of the Hóvas"). From hence the sea and the houses of Andèvorànty (15 miles only as the crow flies) are distinctly visible. Surmounting this hill a descent is made into the valley of the Mahèla, here 30 yards wide and 4 feet deep. Village on the left bank of the same name. Crossing this river, another lofty ridge has to be crossed, and here on the summit a Hóva guard is stationed. More up and down marching over difficult ground and a halt is made for the night at Ampàsimbé, at an elevation of 1,055 feet; the village is situated in a broad amphitheatre, the sides of the hills being densely wooded, but the larger timber has been felled.
Ianlankova	5	..	
Signal station .....	..	..
River Mahèla	2	..	
Mahèla .....	..	..
Station on ridge .....	..	..
Ampàsimbé	3	..	Ampàsimbé is marked on Mullens's map as only 8 miles west of Rànomafàna direct. By the circuitous routes and difficult road it is double that distance.
("at much sand.")			
Day's journey		15	
Total .....	..	109	
			<i>Sixth day's march, Ampàsimbé to Bèfòrona.</i>
			The journey is most wearisome, continually ascending and descending over ridges and terraces, the track mostly leading along the spurs and round the shoulders of ravines between them. These numerous ridges are all higher and higher, and slope out from the mighty wall of rock which marks the upheaval of the elevated plateaux farther inland. The highest ridge crossed is 2,030 feet elevation.
Màroziedngy or	7	..	Leaving Ampàsimbé, the path ascends and keeps chiefly along the lateral hills, and becomes more steep and rugged; the only resting-place is reached at Màrozèvo, 7 miles, a poor village with no supplies. Elevation, 1,385 feet.
Màrozèvo.			Now follows thick forest over slippery ground with narrow passes for some miles, until a clearing and flat open valley is
Carried forward...	7	109	

1100 FRENCH OPERATIONS IN MADAGASCAR, 1883-1885.

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
BETANIMÈNA.			
Brought forward...	7	109	
Bèfòrona	7	..	
Day's journey		14	
Total .....	..	123	
			<i>Sixth day's march—continued.</i> reached, where is situated a considerable village, Bèfòrona. But the valley is swampy and the place notorious for fever, although 1,650 feet above the sea; the mists and fogs strike chill after leaving the tropical heat of the coast level. Ampàsimbé to Bèfòrona direct is 11 miles. The valley of Bèfòrona is 1,650 feet elevation.
			<i>Seventh day's march, Bèfòrona to Alamazaotra.</i> Beyond Bèfòrona, which may be said to mark the eastern limit of the great forest belt, we reach the foot of the great wall of rock, and, turning a little to the north (at Irihitra), way is made over red clay hills for a slight gap or depression in the ridge, and with many a climb and as many a deep descent we at length reach a relay station and collection of wood-cutters' huts. The coast tropical vegetation has disappeared; no longer do we meet with the <i>rafinàle</i> and <i>rofia</i> , but instead, timber trees of enormous size, bamboos, and tree-ferns, interlaced with a thick jungle of undergrowth and parasites. The summit of the pass is 3,470 feet. The track here is absolutely frightful, requiring frequent detours on account of the gigantic trees which have fallen across the path. At Anévoka a level of 2920 feet is attained, and, still climbing through the worst part of the forest passes and ravines, the halt is made at the frontier Hôva station of Alamazaotra at 3,130 feet,—a rise of 1,480 feet within a dozen miles. Bèfòrona to Alamazaotra by map is barely 11 miles.
Irihitra .....	..	..
Anévoka	6	..	
(Ambodasary.)			
Alamazaotra	7	..	
Day's journey		13	
Total .....	..	136	
			<i>Eighth day's march, Alamazaotra to Môramanga.</i> The journey continues through the forest of Alamazaotra, a very trying road, full of mud-holes, and awkward streams have to be passed on rough fallen logs. At 8 miles a cleared resting-place (2,830 feet) is found in Ampàsimpôtsy; after which, still through forest, but partially cleared land,
Ampàsimpôtsy or Ampassapôjy	8	..	
Carried forward....	8	136	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
BETÀNIMÈNA.			<p><i>Eighth day's march—continued.</i></p> <p>a high broad ridge is crossed at 3,460 feet scored by rice-fields cut out on the sides of the valleys, and thence a descent is made to Mòramànga, a market town on the western edge of the forest belt and overlooking the plains of Ankày. Ankày proper is a long elevated plateau or terrace of sedimentary clay, 180 miles long north and south, and from 10 and 15 to 20 miles in breadth, enclosed by bordering chains of hills on either side. The level of the plain is about 3,000 feet above the sea. The chain of hills to the east has a height of 365 feet. It is rather like a tip to the plain below than an overhanging wall; it consists largely too of the same material as the plain itself, with gneiss rocks underlying and intermingled with it. The western chain, on the contrary, is a lofty wall of granite and gneiss, 1,620 feet high; it overhangs the plain in its entire length and passes far beyond it. It is the second of the great ridge walls by which so much of the contour of the island is regulated. It runs the entire length of the island, as far as known, and is covered all the way with wood, which forms the second and upper line of primeval forest. Vast buttresses of rock project into the plain from its lofty front, and deep ravines and valleys run in behind them, giving to the scenery a rich variety of outline and of detail. Ankày should be a level plain. It was once so, but its material is soft and friable, and water speedily washes it away. For countless ages storms and floods of heavy rain have made havoc of its surface. It is ploughed and scored into little valleys in all directions; but the scorings all find an outlet and pass from one to another till they reach the central drain of all, the valley of the Mangòro river. The bottom of this valley is 325 feet below the level of the plain; and the river flows in a little valley within the valley. Naturally this great draining valley with its river runs, like its enclosing walls, a course from north to south, makes its way through the eastern chain, and descends by a series</p>
Brought forward ..	8	136	
Mòramànga	8	..	
Signal station.....	..	..
Carried forward....	16	136	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
BETÀNIMÈNA.			<p><i>Eighth day's march—continued.</i> of rapids and cascades and falls into the sea near Mánahòro. It is interesting to observe that under the western hills, where floods and water are most abundant, the plain is 100 feet lower than at its eastern side. The people who occupy this plain are Bèzànozàno or Tankàys, and are apparently a branch of the Bètsimisàraka tribes who have ascended the Mangòro from the coast; they are yet uncivilized and ignorant. They supply bearers or marmites for travellers up and down from the coast. These Bèzànozàno marmites are not tall, but strong and wiry, and are far the best bearer coolies in the island.</p>
Brought forward ..	16	136	
Day's journey.....		16	
Total .....	..	152
ANKÀY.			<p><i>Ninth day's march, Mòramànga to Angàvo.</i> From Mòramànga 6 miles' easy travelling over the grassy plain intersected with <i>nalas</i>, which form the only impediment, open country and not wooded, Andrànonkòboka, a small hamlet, is passed, and after an hour's travelling a descent is made into the valley of the Mangòro, where at a village on the left bank canoes of a very cranky description are obtainable to ferry across the river, which is here a smooth but rapid stream 30 yards wide. (Mullens puts Andàkana on the right and west bank of the Mangòro.) A little to the west of the ferry stands the lofty wooded hill of Ifòdy. This hill belongs to the western chain, but projects some miles into Ankày, leaving a long broad valley between that chain and itself. M. Dupré gives the height of Ifòdy as 3,677 feet. At the base of Mount Ifòdy is Ambòdinifòdy, where there is a Hóva guard stationed. From the summit of Ifòdy a most extensive view is obtained in all directions. The valley is now traversed, following the course of a river called by Ellis Valàla and by Mullens Màmambòla. Here there are extensive rice plantations and embankments, and several villages are passed of Hóva construction. At the extremity of the valley, which terminates in a fine</p>
Andrànonkòboka	6	..	
River Mangòro .....	..	..
Andàkana	6	..	
Mount Ifòdy .....	..	..
Ambòdinifòdy	8	..	
Signal station.....	..	..
River Valàla or Màmambòla	..	..
Carried forward....	20	152	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
ANKAY.			<i>Ninth day's march—continued.</i> amphitheatre, is the usual halting station named Mandràrahòdy, or Ambòdinangàvo, a Hôva village at the foot of the western ridge of the mountain range of Angàvo. Supplies of rice and cattle are here obtain- able. The valley is fertile, tolerably well inhabited, with villages and homesteads, cattle enclosures, fields, interspersed with plantations and gardens. Ambòdinangàvo has 3,000 feet elevation. Mòramànga to Angàvo on map measures 20 miles.
Brought forward ..	20	152	
Mandràrahòdy or Ambòdinangàvo	6	..	
Mount Angàvo.....	..	..
Day's journey.....		26	
Total	178	<i>Tenth day's march, Angàvo to Ambàtomànga.</i> The Angàvo pass has to be now surmounted, and there is some severe climbing as well as various ascents and descents through ravines to be accomplished, following the course of the river Mandràka, which stream flows by a tortuous route into the Mangòro, densely wooded. At last the watershed of the ridge is surmounted after a long climb, the total ascent from the foot of the great chain to this inner edge of the plateau is 1,620 feet (<i>Mullens</i>). Dupré gives highest point of Angàvo range as 4,346 feet. At 7 miles Ankèramadinika is reached, a regular halting station and Government post,—besides a small market village, the first village in the province of Imèrina proper. Passing through several valleys and over stony ridges, the region of forest has been left behind, and the route leads across bare open downs from which enor- mous tors of granite and gneiss crop out. The large basin of Manjàkandràna, with its clusters of villages, three or four churches, and cultivated fields and thresh- ing-floors. Angàvokèly, a noble mountain, 5,925 feet high, is passed to the north, and to the south are the so-called "Three Sisters," both remarkable land-marks. After pass- ing the village of Ambòhikàma at last Ambàtomànga appears, by far the most imposing of any of the villages yet seen.
IMÈRINA.			
Pass over Angàvo ....	..	..
River Mandràka ....	..	..
Ford .....	..	..
Ankèramadinika	7	..	
Manjàkandràna ....	..	..
Mount Angàvokèly ...	9	..	
Mount Anòsirivo.....	
Ambòhikàma	
Ambàtomànga	5	..	
Carried forward. ...	21	178	
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Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
ANGAY.			
Brought forward...	21	178	<i>Tenth day's march—continued.</i>
Day's journey.....		21	It presents an important and picturesque appearance.
Total .....	..	199	Angavo to Ambatomanga direct by map is 17½ miles.
			<i>Eleventh day's march, Ambatomanga to Antananarivo.</i>
Yedien, village and arched bridge	3	..	Leaving Ambatomanga and its numbers of pits for fattening cattle, and crossing bare downs, a descent occurs leading to the village of Yedien, where a small but remarkable single-span arched bridge is thrown across a small stream flowing south, one of the sources of the Ikopa river. There is here plenty of cultivation, the fields enclosed by banks on which are hedges of a small prickly <i>Euphorbia</i> .
Ambôhimànambôla ...	4	..	Ascending another down, Ambôhimànambôla, the first view is obtained of Antananarivo, the capital city of the Hôvas, distant some 8 miles as the crow flies, and prominent from its high position. The country here is quite open and hardly a tree to be seen except an <i>amontana</i> or <i>divivy</i> , &c., which are generally grouped in each village.
Betâfo.....	5	..	If on an official journey, it is usual to halt at Betâfo until permission is obtained to enter the city, distant 5 miles.
Antananarivo.....	5	..	Ambatomanga to Antananarivo direct by map is 15 miles.
Day's journey.....		17	
Total from Tamatave .	..	216	

Colonel Middleton's estimate was 225 miles in 12 days, at the rate of 18½ miles a day. Lieutenant Oliver's estimate was 216 miles in 11 days, at the rate of 19½ miles a day. Admiral Gore-Jones's estimate was 212 miles in 15 days, at the rate of 14 miles a day; return journey, 215 miles in 10 days, at the rate of 21½ miles a day. Average from above estimates, 217 miles at 18½ miles a day. As the difference between going and returning is great, it may be fairly estimated that the *màromita* can carry a traveller up to the capital at the rate of 15 miles a day, and do the return journey at the rate of 20 miles a day, i.e., fourteen days going up and eleven coming down. Some gentlemen travelling alone have done the journey in six days. It has been performed in five.

ROUTE NO. 2.—ITINERARY FROM ANTANÂNARIVO TO MOJANGA.

The Ikôpa line.

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
IMÉRINA.			<i>First day's march, Antanânarivo to Fihaonana.</i>
<i>Antanânarivo</i>.....	..	..	Antanânarivo, 4,790 feet elevation. The route throughout is generally north-west, and for the first 3 or 4 miles, after leaving the city market, leads across rice-fields until a salient angle of the river Ikôpa is reached, thence following the northern embankment in the direction of the stream whose course here is also north-westerly.
<i>River Ikôpa</i>	3	..	Four miles farther on the river Mamba (Crocodile river) flowing from the east joins the Ikôpa by three channels, which have to be crossed; and on the same bank (viz., the right), and to the north of the track on the bank of the river, is a long ridge (fully commanding the path), which bears on its summit the strategically important town of Abôhidratimo.
<i>River Mamba</i> , joins <i>River Ikôpa</i> on right bank.	4	..	[Abôhidratimo at present only contains 300 houses, but it is the head-centre of a populous district. It was originally one of the twelve royal and sacred cities of Imérina, and occupies the crest of the ridge above a mass of granitic boulders. It is marked by a conspicuous <i>amôntana</i> tree, which is plainly visible all over Imérina. It would therefore form a good signalling station. There is a flourishing mission established in this place.]
<i>Abôhidratimo</i>	1½	..	Leaving this town on the right, there is a great deal of swampy marsh to be traversed, covered with a species of papyrus rush (<i>hêrana</i>), which is used for thatching purposes by the natives, and of which fascines could be constructed. The volume of water in the Ikôpa is now increased by an affluent on the left bank which flows from the south, draining the Bêtsimitàtatra plains. This affluent is named the river Sisàony. Still following the right bank of the Ikôpa for 4 miles, the path deviates so as to skirt the noble
Good signal station...	..	..
<i>River Sisàony</i>	2	..	
Carried forward....	10½	..	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
IMÈRINA.			
Brought forward ..	10½	..	<i>First day's march—continued.</i> hill of Ambôhimandà, which also forms a great landmark, and therefore useful signalling station.
Ambôhimandà Hill... (Signal station.)	4½	..	
River Andrômba or Katsaôka.	..	..	South of Ambôhimandà a considerable stream, the river Katsaôka or Andrômba, flows from the Ankàratra mountains into the river Ikôpa, 2 miles off the track which rejoins the bank of the Ikôpa at a convenient halting-place,— Soàvinimèrina, the half-way resting-place towards Fihaônana.
Soàvinimèrina, mid- day halting site.	3	..	From Soàvinimèrina the course of the Ikôpa river, which is now of considerable importance, directs itself nearly due west, and is joined by another affluent stream (unnamed in map) on the right bank, and at this junction are the celebrated Falls of Fàrahàntsana.
Falls of Fàrahàntsana	..	..	On leaving Soàvinimèrina the track diverges from the main river, crossing the un- named and small affluent before men- tioned some 2 miles above the junction and falls, and on the northern bank of which rises the ridge of Ambôhimirimo, which marks, somewhat indistinctly, the frontier between the province of Imèrina and that of Vônizôngo.
VÒNIZÒNGO.			
Ambôhimirimo, sum- mit of ridge.	3	..	After crossing the ridge the broad valley of Vônizôngo is entered, the first village being Vangaina, beyond which the river Anjomôka is forded, and after passing the hamlet of Ampàribé another small tri- butary stream, the Āsinabé, is reached, which after junction with the former flows westerly into the main stream of the Ikôpa, whose banks are here at least 10 miles westward of the track.
Vangaina	2	..	From hence endless rice-fields are passed on very narrow paths and the course is more northerly. A few more unimportant brooks, chiefly useful for purposes of irri- gation, are crossed, and the ground rises from Ambôhipiaïnana up the banks of a watercourse to Fihaônana, completing the first stage from the capital towards the north-west coast after eleven hours' journey, including the halt for mid-day meal. Elevation, 4,450 feet.
River Anjomôka	2½	..	
Ampàribé .....	..	..	From hence endless rice-fields are passed on very narrow paths and the course is more northerly. A few more unimportant brooks, chiefly useful for purposes of irri- gation, are crossed, and the ground rises from Ambôhipiaïnana up the banks of a watercourse to Fihaônana, completing the first stage from the capital towards the north-west coast after eleven hours' journey, including the halt for mid-day meal. Elevation, 4,450 feet.
River Āsinabé	2½	..	
Ambôhipiaïnana	2½	..	From hence endless rice-fields are passed on very narrow paths and the course is more northerly. A few more unimportant brooks, chiefly useful for purposes of irri- gation, are crossed, and the ground rises from Ambôhipiaïnana up the banks of a watercourse to Fihaônana, completing the first stage from the capital towards the north-west coast after eleven hours' journey, including the halt for mid-day meal. Elevation, 4,450 feet.
Fihaônana	3½	..	
Carried forward....	34	..	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
VONIZONGO.			
Brought forward ..	34	..	<i>First day's march—continued.</i> Fihaonana is distant from the capital direct as the crow flies 30 miles in a north-westerly direction.
Day's journey.....		34	<i>Second day's march, Fihaonana to Ankazobè.</i>
Fihaonana .....	..	..	Leaving Fihaonana in a northerly direction, the small villages of Ambòhitrimàmàmba and Isandavèla are passed on the left, and the track leads up to the high moors, several minor streams being forded <i>en route</i> . The ground ascends, passing several clusters of villages, Antanòtibè and Andramanjàka, up to the crest of the great ridge of Ambòhimànga, which here curves towards the east, at an elevation of 4,600 feet above the sea. On this plateau, distant 5 and 12 miles to the west respectively, are the villages of Sambaina and Fierèrana, important church stations; while to the east on the bank of the Andranobè river are populous villages of the northern Vonizongo.
Antanòtibè	8	..	At Ambàtomalàza the route commences to descend over the edge of the ridge to a lower level some 700 feet, and the valley of northern Vonizongo is entered. This is a long level valley between two pleasant lines of hills, drained by the river Andranobè. On the left is the fine ridge of Ambòhidambinana, with a large village, Ambòhijàfy, at its foot on the left bank of the stream, along which the track leads; while on the farther or east side of the valley is Tsiàfabalàla, a conspicuous hill, fit for a signalling station, with villages at its base. Other small villages are also scattered throughout the valley.
Andramanjàka	2	..	
Ambòhimànga ridge ..	1½	..	Proceeding farther north for half a dozen miles ¹ along the left bank of the Andranobè, a curious and sudden bend of
Sambaina .....	..	..
Fierèrana .....	..	..
Ambàtomalàza	2	..	
Ambòhidambinana ridge	..	..
Ambòhijàfy	3	..	
Tsiàfabalàla .....	..	..
(Ambàtòambaina.) ...	..	..
River Andranobè	20½	..	
Carried forward....	20½	34	

¹ There is a discrepancy in the description of route as in Mullens's map. Ankazobè is placed close to the curious bend of the river, yet he says he halted at Ambòhitromby and had a pleasant and easy journey afterwards; he does not state how far or for how long.

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
VÒNIZÒNGO.			<p><i>Second day's march—continued.</i> the stream takes place, and it has to be crossed twice. A few villages are passed beyond this bend of the river when Ambòhitròmby is reached. Mid-day halt. [The river Andrànobè rises on the northern slopes of Adringitra, east of Lohavòhitra; thence it flows in a north-west direction through the populous valleys near Ambòhitrolona, with their numerous churches, and rounding the promontory of Ambòhitrandriana's eastern shoulder drains the northern Vònizòngo, and taking a sudden bend to the west near Ambòhitròmby flows westwards into the Ikôpa, 10 miles west of the track.]</p> <p>A pleasant and easy journey [of which no details are given by Dr. Mullens] brings the traveller to Ankàzobè, at an elevation of 3,830 feet, completing the second day's march from the capital, distant 50 miles south-east. Ankàzobè has only fourteen houses surrounded by deep fosses and high cactus hedges, full of dust and pigs, a chapel with falling wall, clumsy window frames and no windows. Cold at night in July.</p>
Brought forward ..	20½	34	
Ambòhitròmby	½	..	
Tend. Ambòhitrandriana.	..	..
Ankàzobè	6	..	
Day's journey.....		27	<p><i>Third day's march, Ankàzobè to Kinàjy.</i> From Ankàzobè the pathway leads under the east flank of Mount Angàvo, whose ridge attains an elevation of 4,880. The summit is well suited for a signal station, as from hence a vast prospect is obtained over a treeless empty wilderness,—the only population existing in the long valley of the Andrànobè in North Vònizòngo. [The whole district is within the region of the sedimentary clay; the valleys have been scored out of it by water, and naturally the clay hills are of one height. Looking over the eastern ridge in the direction of the Anàtivòio not one prominent hill is discernible, all the summits being of one uniform height. To the west it is just the same. The only exception is in portions of ridges like the Angàvo mountain. This is a grand mass of gneiss, and the bluff at its</p>
Total .....	..	51
NORTH VÒNIZÒNGO.			
Mount Angàvo (suitable signal station)	..	..
Carried forward....	..	51	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
			<i>Third day's march—continued.</i>
			northern end is a lofty perpendicular precipice, one of the finest in the country. North of Angàvo the next ridge is unbroken, the valley of North Vônizôngo being completely shut in; part of the waters escape down the Andranobè on the south-west, the remainder, swirling round the precipice at the head of the ridge, cut a hollow in the northern hills, and escape along the west side of Angàvo in the river Antràmbo. Angàvo ridge and others parallel to it trend off to the south-west. To the south Tsi-àfo-balàla and Lôhavôhitra are conspicuous points.]
NORTH VÔNIZÔNGO.			
Brought forward...	..	51	
Mândrosà <i>(Lazaina).</i>	6	..	At 6 miles the hamlet of Mândrosà is reached, and rounding the base of the mountain the river Antràmbo is reached and crossed near the village of Antàndrokômby, which contains 40 houses and is overhung by the northern precipices of Mount Angàvo. The river Antràmbo, like all those before mentioned, is a tributary of the Ikôpa, the main river, which flows nearly due north some 20 miles off, parallel to the track. After a few miles a good halting station is obtained at Mahàridàza. (4,440 feet.) It is a village of 42 houses, with countless herds of swine.
River Antràmbo <i>(Lazaina).</i>	..	..
Antàndrokômby <i>(Andrainarivo).</i>	7	..	
			On leaving Mahàridàza the course lies up the inner bend of a long valley, and a somewhat steep ascent leads over the pass of T. Ambôhimèna at 4,800 feet elevation. [Nowhere are signs of recent upheaval; the entire country is sedimentary clay, which has buried and enveloped the gneiss ridges and boulders of an earlier time, now cut and scored to great depths by the action of water. To the east and west the tops of the hills are of the same height. To the north the clay has given way. This red hill of Ambôhimèna and the ridge to which it belongs is the edge of the Vônizôngo terrace. On the north side the ground begins rapidly to fall. This descent is patent to the eye, and it shows itself in two parallel valleys, divided by a remarkable line of conical hills.]
Mahàridàza (halting place).	5	..	
T. Ambôhimèna Pass (summit of peak, 5200 feet).	7	..	
Tsiàfàhy .....	..	..
Carried forward....	25	51	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
NORTH VONIZONGO.			
Brought forward ..	25	51	<i>Third day's march—continued.</i> It takes less than three hours from Mahàridàza to reach Kinàjy at 4,100 feet elevation. [The town of Kinàjy is the first of a series of military stations, five in number, in the direction of the Sàkalàva country, and along the line of easiest access. They form a series of defensible posts, within easy communication at intervals of from 6 to 10 miles, and small clumps of houses are found in their neighbourhood. Each of these posts has its commander, Government house, and garrison. Each is at the same time a great cattle station and depôt, and immense herds belonging to men high in authority in Imèrina are fed and tended in their neighbourhood. The <i>kraals</i> in which they are kept are very large.] Kinàjy consists of 68 houses placed on the spur of the hills, having many deep gullies on its northern side. On the south it has a double gateway, and each gate can be closed both with poles and stones.
Kinàjy	8	..	
Day's journey		33	
Total .....	..	84	
			<i>Fourth day's march, Kinàjy to Ampòtaka.</i> The moment Kinàjy is left the ground begins to fall, and the country throughout is very easy to traverse. The route strikes north-east over a fine valley, and at an opening between two conical hills arrives at a little winding river named the Mânankàzo, ("that which has wood"), the only bushes and trees being found in the ravines of this otherwise dry clay country. This stream rises in the hills near Vòhilèna to the north of the Anàtivòlo. On the banks and along the foot of the hills there are quantities of various sedges and long species of grass and reeds. Passing to the eastward over the shoulder of these rounded hills the track leads through another valley between high parallel gneiss ranges, with a rough and rocky edge. A stream of clear water comes out of the eastern hills of Mârìtsipòy, called the Firingalàva, and the path crosses many
R. Mânankàzo	6	..	
(Kiangàra.) (T. Ambòhitròlomanana.)			
Mârìtsipòy Hills.....	..	..
River Firingalàva.....	5	..	
Carried forward....	11	84	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
NORTH VONIZONGO.			<i>Fourth day's march—continued.</i>
Brought forward ..	11	84	streamlets rushing down to join it, and, following down with the current to the north-west, reaches Ambôhinôrina. Ambôhinôrina, the second of the Hôva frontier stations, contains 50 houses and a chapel, and is duly enclosed with the ditch, wall, and gates. It is garrisoned and commands the valley of the Firingalàva.
Ambôhinôrina	4	..	
Basin and ravine	4	..	Following the stream north, 4 miles farther on is a deep basin which ends in a ravine, down which the river runs. A ridge is climbed on the right bank, and the route lies between two fine mountains, viz., Sâhâfâsika to the west, 4 miles in length, and Ambôhibè on the right. Both these mountains can be observed from Mount Angàvo (see <i>ante</i>). The double head of the latter, Ambôhibè, makes it a conspicuous object for many miles. [Distance for signalling from Ambôhibè to Angàvo, 30 miles.]
Mount Sâhâfâsika. .. (Tsinaïnôndry.)	4	..	
Mount Ambôhibè .....	..	..
(Good signal station.)			
Ampôtaka	9	..	The path keeps under the flank of Mount Ambôhibè, over the right bank of the Firingalàva, some 9 miles to Ampôtaka, the third garrison town, containing 30 houses, and in addition an immense cattle fold, filled with fine herds. The elevation of this Hôva station is 3,100 feet, showing a fall of 1,000 feet from the post of Kinàjy in 32 miles.
Day's journey .....	..	32	
Total .....	..	116	
			<i>Fifth day's march, Ampôtaka to Malàtsy.</i>
Ampàrafàra .....	..	..	Beyond Ampôtaka high ridges are encountered which offer serviceable observing and signalling stations, but over which the east wind sweeps with violence in July (<i>i.e.</i> , winter). From one point on Ampàrafàra hill deep valleys are looked down upon, over Tiavôly, and the gneiss and granite-ridged terraces of Ampàravôla, which looks down on the east bank of the Ikôpa river, and the hills are very fine in all directions. At 7 miles the upper edge of a waterfall is passed, and a rapid descent made into the valley of the Mâhamôkamita ("that which makes mosquitoes to cross") river, which, having
Tiavôly .....	..	..
Ampàravôla .....	..	..
Waterfall	7	..	
River Mâhamôkamita (T. Mâvoândro.)	4	..	
Carried forward. ...	11	116	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
NORTH VONIZONGO.			<i>Fifth day's march—continued.</i>
Brought forward ..	11	116	its rise in the moors to the south-east, here cuts deep and falls in a fine cascade in a deep glen or chasm through the ridge of Anjàvona. The scenery here is bold and pleasing, and after 4 miles along the right bank an open level amphitheatre is reached, in the centre of which stands Màngasoàvina, the fourth of the Hóva frontier posts. [Màngasoàvina is a pleasantly situated town of 80 houses, enclosing a (<i>ròva</i>) Government house, and stockade, with abundance of cattle, pigs, and fowls. The valley basin in which this station stands is 8 miles across; the land is grassy and level. Several villages were in sight, and the number of houses in these villages and the town together is estimated at 400.] The elevation is 2,635 feet, and the <i>locale</i> is well suited for the camping-ground of a considerable force.
Anjàvona ridge .....	..	..
Màngasoàvina	4	..	
(Màrohàrona.)			
(Andrànorèlona.)			
(Tsiàfakarivo.)			
(Manàkona.)			
Camp ground .....	..	..
Andriba Hill	5	..	Proceeding on for 5 miles a fine gneiss hill, Andriba, which forms the northern boundary of the level plain, is rounded on its east flank, when a second level and broad valley is crossed, and here there are fine clumps of the <i>rofia</i> palm, and a few traveller's trees (<i>Urania</i> sp.) There are plenty of rice-fields, well cultivated, with numerous small villages. This spacious valley is drained by the river Kàmolàndy, which, like the former streams crossed by this route, falls into the Ikôpa river, whose main stream is now about 15 miles to the west. A mile beyond the river is the fifth and last of the Hóva garrison towns, Malàtsy, at an elevation of 2,550 feet.
River Kàmolàndy	9	..	
Malàtsy	1	..	Malàtsy contains 60 houses, whilst on the slopes without there may be some 90 more, and about 100 others scattered about the valley, in the centre of which is a Sàkalàva village. The Hóva frontier proper terminates here.
			Beyond Malàtsy and the scattered houses in the neighbourhood is a belt of country commonly termed "no-man's land," or the wilderness or desert. This region is altogether unpeopled, and forms the debatable border ground between the
Carried forward	30	116	

Province and places on or near the route.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
NORTH VONIZONGO.			<i>Fifth day's march—continued.</i> coast tribes and the more civilized tribes of the interior, extending in a ring at an elevation between 2,000 and 1,000 feet more or less connectedly all round the island. There is no rice and no cultivation. Lying as it does between the highland tribes of the Hóvas and Bétziléo and the Sàkalàva of the plains on the coast, between whom until quite recently there has ever existed a perpetual feud, no permanent settlement or habitation and cultivation would be safe from either side, and as the resort of criminal outcasts and runaway slaves the transit across this region has always been considered hazardous, and doubtless stragglers would run a great risk, but more from want of food and assistance than bodily injury.
Brought forward ..	30	116	
Day's journey.....		30	
Total .....	..	146	
Delta formed by Bèt- sibòka and Ikòpa rivers.	..	..	<i>Sixth day's march, Malàtsy to Andrànolè.</i> Beyond Malàtsy the course during this and the following marches passes through a pleasant country, anything but desert to the eye, well watered with plenty of running water and gently-sloping hills and dells covered in great part with woods, and bounded on the westward by the Ikòpa river, now a noble stream of imposing dimensions, but with rocky bed of steep gradient, approaching its junction with the Bètсібòka river. This district narrows as the heads of the delta between these two rivers converge. At Malàtsy the Ikòpa is 15 miles to the west, and the Bètсібòka runs 27 miles to the eastward, both uniting 45 miles as the crow flies north by west from Malàtsy. [The track lies over long valleys, over first one pass and then another, or over hard clay ridges sprinkled with quartz gravel, and then along some clear stream bordered with fresh green wood. The valleys were simple and open and very green. The <i>rafia</i> palm grew more abundantly, and there were varieties of acacia with bamboo <i>palm</i> and the <i>dabo</i> (sp. fig-tree), as well as the bamboo <i>cane</i> , wild citron, and, as usual, quantities of strong coarse grass. All the
Carried forward....	..	146	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
NORTH VONIZONGO.			<i>Sixth day's march—continued.</i>
Brought forward ..	..	146	streams cut their way to the rock, forming deep gullies in the ubiquitous red clay.]
Ambôhilôsy ridge ....	..	..	The road at first runs north-east parallel to the Ambôhilôsy (leaving the last village, Soavinandriana, under Ikato hill, some miles away to the right), strikes the sources of the Andrânobè at Ambôhimèna, and follows the left bank of the stream, continually descending. The best site for a mid-day halt is at the Pass of Märokolôsy, over which the ridge is bold and high, and suitable for a signalling station. A second ridge is next crossed called Kälomainty, 1,290 feet, whence a descent brings one into the green valley of the Ampäsoria river. [At the north end of this valley the long grass was found burning by Dr. Mullens, a proof that the Säkäläva are in the habit of tending their cattle with the young grass which springs up after the dry grass is burnt.]
Soavinandriana.....	..	..	A third ridge has now to be crossed, 1,240 feet, after which the traveller passes down a rocky valley and enters a piece of country like an English park, well watered by the river Andrânobè. The flies are found to be troublesome in these valleys. The shoulder of a hill is now turned between two bends of the Andrânobè, and the camping-ground is found conveniently situated on the left bank of the western arm, within 5 miles of the great rapids of the river Ikôpa. Elevation not given, estimated at say 1,040 feet.
River Andrânobè ....	..	..
Ambôhimèna	8	..	
Märokolôsy Pass	7	..	
Signalling station ....	..	..
Kälomainty Pass	4	..	
River Ampäsoria ....	..	..
Camp ground on the Andrânobè.	10	..	
Day's journey		29	
Total .....	..	175	
			<i>Seventh day's march, Andrânobè to Mëvanàna.</i>
Mënavàra Plains ....	..	..	Crossing the river Andrânobè, the track follows for a space of 4 miles the rocky valley of that river, and the bottom of the hill country was visible, the plains of Mënavàra stretching away to the distant horizon. The banks of the Ikôpa at Antänimbärindratsontsöraka are here reached, and followed for several miles past rapids and islands to Anôsifito, a notable group of seven islands in the bed of the stream. The track now turns a little inland and crosses a small stream, the Andrânobè.
Antänimbärindratsontsöraka.	..	..
Anôsifito or Seven Islands.	4	..	
River Andrânolêràva	..	..
Carried forward....	4	175	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter- mediate.	Total.	
NORTH VONIZONGO.			<i>Seventh day's march—continued.</i>
Brought forward...	4	175	vava, and arrives upon a region of wild disorder. Here the gneiss strata have been tilted perpendicularly, and hills of quartz, gneiss, and clay have been thrown up, made up of fragments of the primitive rocks. The country is covered with countless boulders, many of which are of enormous size. Multitudes of these huge waterworn masses are half-buried in the clay. This soil is the drift and <i>débris</i> of the higher districts. The present Ikôpa river bed and ravine indicates the line of the valley down which the drainage of Imerina has poured for countless ages, and it is here that the material brought down from the hills has been deposited upon the plains. Enormous forces have evidently been at work; the result of mighty floods and the outpouring of lakes by the rending of barriers are everywhere stamped upon this widespread scene of ruin. It takes four hours' traversing without any source of potable water being procurable, so that the bearers suffer much from thirst. At last a beautiful glen is reached on the north edge of the drift, down which flows a stream of pure water, which has its sources in Tainanjdina, the Anàndronjia.
Plain of drift and boulders.	..	..
(<i>River Mènavava</i> .)			
Tainanjdina .....	..	..	Crossing this stream, the high banks of the Ikôpa river are followed for several miles to Mèvatanàna. Mèvatanàna justifies its name, which means "an excellent site for a city." It stands on a spur of that inner ridge of clay through which the Ikôpa has cut its way, and has deep ravines on three sides. The town is 240 feet above the sea-level; the river is 150 feet. This somewhat important town contains 168 houses, of which 80 are within the stockade. The governor's house is in a broad open square, close to which are the principal shops for cloth, meat, vegetables, and fruit. The town occupies an admirable position in relation to the country generally. It stands on the edge of the hill districts and of the fertile plains. It is 2 miles from the right bank of the river, at the point to
River Anàndronjia...	10	..	
Mèvatanàna	7	..	
Carried forward...	21	175	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
NORTH VONIZONGO.			<p><i>Seventh day's march—continued.</i> which the river is navigable for canoes. It is a good stopping station for all travellers from the coast, and the first resting-places to others journeying from the capital. It is also the edge of the inhabited belt. To the east and south the country is empty. Across the river to the west the district contains a few Sàkalava villages, of 3, 5, or 7 houses, at long intervals. It is the most southerly of the six fortified Hóva posts which end with the port of Mojangà. A considerable number of the inhabitants of the town are the Hóva garrison from Imèrina. Below Mèvatanàna and above the influence of the tides the shallows are more numerous and formidable, and from this post it is usual to hire canoes and continue the journey down the Ikôpa river by water. From Mèvatanàna upwards all the upward trade must go by land, a distance of 150 miles across country by map, and, as above estimated, at least 196 miles by the track, which has, if anything, been rather under than over-estimated.</p>
Brought forward ..	21	175	
Day's journey		21	
Total.....	..	196	
AMBONGO.			<p><i>Eighth day's march, Mèvatanàna to Kàrambily.</i> Mèvatanàna is 2 miles from the point of embarkation on the east bank of the River Ikôpa, and from hence it is usual to proceed by water in canoes. [The route by land follows the course of the river at a distance of from 5 to 8 miles, and will be described in Route No. 3 following. The River Mèndràva enters the Ikôpa on the left bank.] It is not easy to procure many canoes of any size. The average size of a large canoe is about 40 feet long and over 3 feet broad, and these vessels will carry 43 men. Here the river is about 300 yards broad, but shallow and full of islands. Three miles on the islands cease to appear, and two long reaches to the north and west are traversed. Astonishing numbers of cro-</p>
(Left bank of Bètsibòka.)			
Mèvatanàna	2	..	
(Place of embarkation.)			
River Mèndràva .....	..	..
Canoes. (Ibèràsimàna.)			
(T. Ampànazàva.)....			
Carried forward....	2	196	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Intermediatc.	Total.	
AMBONGO.			<i>Eighth day's march—continued.</i>
Brought forward ..	2	196	codiles are ever to be seen in groups on the sandbanks all the way down the river.
Ambinany.....	10	..	A resting-place is found at Ambinany, a village on the left bank, and marked by a noble tamarind tree. A mile farther on the waters of the Ikôpa flow into the more important river Bêtsibôka, and the united streams, keeping the name of the larger, the Bêtsibôka, flow on to the sea. At the junction the Ikôpa is a quarter of a mile broad, whilst the Bêtsibôka is much broader; and in the rainy season tremendous floods throw the Ikôpa's waters far into the western bank and produce the broad sands whose banks are bare in the dry season.
Junction of the Ikôpa with the Bêtsibôka River. (Ambatovato.)	1	..	Four miles away to the east is the town of Amparihîbé ("at the big lakes"), standing prominently on its clay hill. Proceeding down the river, past Betanimâhamây, over broader but not deeper waters, the course is somewhat tortuous. The banks are covered with vegetation, and here and there the trees are of considerable size. The course is north-west, and the speed of the canoes is about 4 miles an hour with the current, which flows strongly. Beyond Betanimâhamây is the village of Ambàrambè under Mount Tsitôndrona.
Amparihîbé .....	..	..
(See Route No. 3.)			
Betanimâhamây.....	14	..	Twenty miles down the Bêtsibôka from its junction is the halting place of Kàrambily, a small Sâkalâva village; and 6 miles to the east, on the opposite side of the river, is Ankoala.
(On left bank.)			
Ambàrambè .....	..	..	Since leaving Mèvatanàna the country passed through is held by semi-independent tribes of the northern Sâkalâvas down to the sea-coast. Its features are well-defined, the granite hills and their long spurs forming an inner boundary to the broad and beautiful plains. It is everywhere beautifully green. Warm in climate, it has tropical vegetation, including the fan-palm, the tamarind, the mango, together with fruitful plantains. The grass is rich for the many herds of cattle; and the enclosed basins and undulating plains seem capable
Mount Tsitôndrona ..	..	..
Kàrambily	6½	..	
Ankoala .....	..	..
(See Route No. 3.)			
Carried forward....	33½	196	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
			<i>Eighth day's march—continued.</i>
			of producing roots, vegetables, rice, and tropical fruits. But the population is thin and scattered. The Sàkalàva villages consist of 10, 15, or 20 houses; and they are few and far between. The simple dwellings of the Sàkalàva people have a singular appearance, looking more like huge bird-cages, being formed of split bamboo and reeds, and quite open to the winds. The province on the left bank of the Bètsibòka is Ambòngo, and that on the right Ibòina.
			<i>Ninth day's march, Kàrambily to Bèmbatòka Bay.</i>
AMBONGO.			
Brought forward...	33½	196	
Day's journey		33½	
Total .....	..	229½	
<i>Kamòna or Kamòro River.</i>	5	..	Leaving Kàrambily, the canoes pass in an hour's time a small river, the Kamòro, which joins the Bètsibòka river on the right bank.
<i>Tràbònjy..... (Bèsèva.)</i>	..	..	Beyond it is another of the Hóva garrison towns, Tràbònjy, 5 miles inland, situated on a hill, and mentioned more particularly in Route No. 3.
<i>Tsitòndrona ridge.... (Antàfikaràny.) (Màrohàla.)</i>	12	..	The main stream now takes a more winding course through the hills of the Tsitòndrona ridge mentioned in the previous day's journey, passing dark and thick woods under T. Ankàrafàtsy and luxuriant vegetation, long gardens of plantains and bananas, the plantations of the Sàkalàvas.
<i>T. Ankàrafàtsy .....</i>	..	..	Animal life is also more abundant. Egrets and flamingoes, pigeons, and <i>Nectarinia</i> abound, and many aquatic birds of the duck species rise in flocks at intervals. The effects of the tide are also here met with, although as yet some distance from the estuary at the head of Bèmbatòka Bay.
<i>Estuary and shallow delta at head of Bèmbatòka Bay.</i>	10	..	
<i>Mahàbo</i>	15	..	Fifteen miles lower down the town of Mahàbo is passed 4 or 5 miles inland from a fine broad reach, which opens into the marine estuary at the head of the bay. Mahàbo is on a conspicuous double-headed hill.
			The course is now nearly north, and a halt should be made at the mouth of a small river which runs down from the garrison town of Màrovoàny (see Route No. 3), and
<i>Màrovoàny .....</i>	..	..
Carried forward...	42	229½	

Province and places on or near the road.	Distances in miles.		Description of route and neighbourhood.
	Inter-mediate.	Total.	
			<i>Ninth day's march—continued.</i> the salt water is attained. Here it is necessary to exchange the long narrow canoes for broader dhows to sail across the bay. Opposite the halting-place, under Märovoà, in Ibòina, are two large islands covered with dense jungle, with mud-banks thickly interwoven by mangrove roots and quantities of the <i>Via</i> or Arum lily of gigantic size, similar to that which grows on the east coast under the same conditions. The open dhows are 30 feet long, 8 feet broad, and 6 feet deep, with broad stern partially decked with the ordinary Arab lateen sail.
Brought forward	42	229½	
Day's journey		42	
IBÒINA.			<i>Tenth day's march, Bèmbatòka Bay to Mojangà.</i>
Mojangà.....	27	..	
Day's journey		27	
Total from Antanà-narivo .....	..	298½	Under favourable circumstances the dhows sailing down the Bay of Bèmbatòka take about 10 hours to accomplish the distance of 27 miles from the mouth of the Bètsibòka to the port and town of Mojangà, after a journey of 298 miles from the capital.

The direct distance from Antanànarivo to Mojangà as the crow flies is only 240 miles, of which 90 are by water as far as Mèvatanàna, and 150 by land direct; but taking into consideration the tortuous course of the river and the deviations and hills, valleys and gullies by land, the actual road cannot be far from 300 miles in round numbers. Again, these journeys have been accomplished by natives in the above number of marches, and messengers can do the same distance in eight days. Dr. Mullens, travelling comfortably with frequent halts, accomplished the journey in sixteen days from Vònzòngò downwards. Upwards, against the stream and with frequent ascents, at least eighteen days should be estimated for the ordinary traveller travelling in filanjàna.

From the upper plateaux of Imèrina and Vònzòngò the country above described is divided naturally into three sections, differing in a marked degree from one another. The first section includes the inhabited country, almost treeless, protected by the Hóva posts, and consists of four broad terraces, of which three mark very decided falls of the ground towards the sea. The course, however, leading obliquely across these terraces, and therefore over easy gradients to Malàtsy. Beyond Malàtsy comes the second distinct section of the journey, namely, the portions of uninhabited wilderness termed "No-man's land," prettily wooded and undulating, terminating in drift at the base of the hills. The third section comprises the cultivated plains and hills of the Sàkalàva coast tribes.

The CHAIRMAN (Admiral Jones) : As we have got the prospect of seeing General Digby Willoughby very shortly, I suppose the generality of people would like to reserve their questions as to any information they may want till that event occurs, which will not be more than another week. It strikes me very forcibly that a very great blessing has come to the Hovas in disguise. This war that has gone on has been the grandest thing for the Hova nation that perhaps has ever occurred. When I was at Antananarivo four years ago, the troops were well trained then, spearmen and musketeers and all the rest of it, but there was no true teaching then at all. Now out springs this war, and the French send a perfectly inadequate force. They are not like our men in the East, not men like General Stewart had under him, who was ready in the torrid zone with 1,500 men to meet tens of thousands and put them to flight. Those are not the men they have got, and the consequence is, they failed altogether. I mentioned in my ascent to Antananarivo that I thought the Hovas were the best raw material I ever beheld for making troops; they were very active, could carry large loads, splendid wind and physique in every way, but further they were not taught. Now this has come about and we find that these troops have been encamped, subject to orders, well looked after and well armed—we had an account of their uniforms and all that sort of thing—and kept in perfect order, ready for service with the French enemy in front. Now that was the finest thing that could possibly have occurred to the Hovas. They are regularly trained now, which they never were before, and I take it if any other nation ever goes to have a tussle with them, they will find them a very different class of men to what they were. You recollect at the beginning of the American War the first battle in which the Federals fought the Confederates was a case of you run, they run, and running all the time—that was the battle of Bull's Run; but a short time afterwards the bloodiest battles that ever were fought were fought by the same men, because they were disciplined and taught how to do things; that will be exactly the case with the Hovas. I have no doubt the French will never put their feet there again in a hostile way. They have always been singularly unfortunate with the Malagasy; they have had many expeditions. It was originally colonized by the French 200 years ago, but the strange thing was the whole fighting then was down south; now it seems to have shifted right up to the north. Fort Dauphin in the south was for some years in possession of the French, but they eventually gave it up. We had a place colonized with 400 people, which some of the people ran away from the French place to go and see, and when they came there they found a graveyard and nearly 400 graves in it, and not an Englishman there. We had colonized it before the French, but we never were successful, because our great enemy was the climate. Now it is not that the climate is actually bad itself; I do not suppose it is very much worse than Mauritius; but it is that we have no knowledge how to inhabit it. It is like a basket of eggs, the whole of Madagascar, and the streams all run down through the fissures. The people live upon rice and other vegetables, which they grow where these streams are. The consequence is, they live in paddies; it is a kind of paddy-field. When I was up there I sometimes found my bed going down under me—it was so soft; that is the reason of the unhealthiness. When I went up there it never ceased raining; we were for six weeks in constant rain, but we never had a man sick, though we had 300 carriers. The hot weather brings fever of all kinds, and that is the reason the French appear to have been so unfortunate. No doubt it was a great mistake in France. They talked a great deal about it; it was very much discussed in Europe, and everybody felt that they were doing a wrong act when they were going to take Madagascar. They have no right on their side whatever, but they chose to go and we see the result. The result is, they have made the Hovas almost a warlike nation; they will be perfectly ready the next time they are attacked, and I have no doubt in the world that Madagascar may now be considered an independent country, because the fact of the French being there means nothing. I have been at Nôsy-Bé, and a more God-forsaken place I never saw in my life. It will be the same at Diego Suarez the moment *la Gloire* and everything else has gone; you will never hear anything about the French. I attribute the want of success of the French entirely to the country, because the country was very much against them, but there was also a want of *élan* in the troops. I do not think the Malagasy are a warlike race.

Whenever we have had to meet them, they seem naturally to have got the worst of it, and therefore I attribute rather more fault than our lecturer seems to do to the French. I do not think they had the go in them. However, that all remains in the future. One thing we may be all very much surprised at, that is, that the Malagasy, after contest with one of the most warlike nations in Europe, have come off victorious. It has been remarked that the Prime Minister agreed to pay too great a fine; but it is also said that he has discovered a gold mine, and that the fine is a mere nothing to him. I believe he is working that gold; I hope it is so with all my heart, because the one thing they do want is money. When I was out there they had no coin. We took a dollar, broke it up into little bits, and they weighed it with scales. Everybody took out his scales who wanted to buy anything. I believe that the Hova nation are the most educated people in the world. The missionaries have had them under their care; they have taught them reading, writing, and everything that could be taught them. They have got some of the standard works, and one gentleman who attended the Legation I was told had every standard work in the English language in his library, which he had read attentively. All the children as you went in and out sang hymns, and were very much like our own. Education will tell, because it brings out intelligence, and those people are extremely intelligent, and they will prove a very formidable enemy when they are properly drilled. I do not think we need have any alarm of the French having another expedition in our day. I was asked by an official of high standing in England whether we could not turn the French out of Diego Suarez if we chose, and said, "Why do we allow the French to seize what they have no right to?" They said the Hovas were independent and were declared to be independent after the taking of the French Islands, and the whole of the Sakalavas did homage to the King then reigning, and proclaimed that Madagascar was one island and he was the Sovereign. That has never been reversed, and no doubt the fact that the country is now allowed to be under one monarchy again is one of the great gains which the French have given us, because, after fighting them and after being beaten, they admit that all Madagascar is one island. If there is any gentleman here who would like to ask any question, we shall be very glad to listen, and we shall be very glad to hear the Bishop of Mauritius, who must know a great deal about that part of the world.

The BISHOP OF MAURITIUS: I feel, Sir, that I have learnt a very great deal since I came into this room; we are very much cut off in Mauritius from any communication with Madagascar. I am sure that General Willoughby will be able to give you a great deal of information, as will also my *confrère*, the Bishop of Madagascar, who will shortly arrive in England. He was at the capital when all this occurred, but my inability to hear from him prevented my being personally acquainted with many of those details that have been so completely set before us to-day. At Mauritius, I must confess it strikes me we shall suffer a good deal from the occupation of Diego Suarez by the French, because we coal all the French mail steamers and the French men-of-war. I heard in Mauritius that the French claim a great deal more than the small adjacent territory that has been so very graphically described in this paper, but how far that is true I am unable to state. We hope that the opening up of Madagascar to a certain extent to civilization will afford our better class of Creoles what they need so very much at present, an opportunity of emigration into Madagascar. We are now in great trouble both in Mauritius and Bourbon, and are very anxious to find some employment for a number of our poorer Creoles of chiefly French origin, but at present we are informed that there is nothing fixed. No one when I left seemed to be aware of what was the real state of things, whether the French would leave Tamatave in another week or whether they were going to stay, and so forth. But we are hoping that numbers of our people may find something to do, and may open up the country to labour and commerce. I hear from all my friends there that the new generation of Malagasy is very much superior to the present one, and that whatever they have gained by the *prestige* that now accrues to them, will be utilized by the better-informed class of young persons who are coming up.

Captain BOYLE, R.N.: As one who has actually been on the coast a good deal, and who knows many of the places that are named, I should like to say that I do not

know whether those who are here to-day who have not been there, understand that the point called British Sound, at the top of the map, is the one that is spoken of as Diego Suarez. Although it bears the British name in all the charts, the French have altered it, because I presume they object to the term British Sound. I have been in that harbour, and no harbour in the wide world is easier to defend. The French have got hold of the very key of the position, there is no question about that. The point the people of England have failed to understand is that Diego Suarez commands the trade on both sides of that great island. Our Eastern trade, with the Suez Canal blocked, must go on this hand of Madagascar or on that hand, and you may have that noble harbour the British Sound, full of the enemy's cruisers, waiting to pop out and harass our trade, that is the point we shall not discover till we have the very best reasons to know it. We have allowed the French to get there, and I am afraid nothing can be done. It has not been without due warning. I know our Chairman has had his hand in the warning, as well as other people; but there is a sort of fatality that comes over a nation, they allow their trade to be interfered with in this kind of way, and then say, "Who would have thought it"? On the west coast the climate is very much better than on the east. The east coast is the worst for fever, but even on the east coast, to show you it is not a very bad climate, I may tell you that our boats used to cruise about, sometimes as much as a fortnight away from the ship, quite in the open, never landing, but going into all the harbours as they went along, and never any of them suffered; we never had any fever in consequence of that. On the west coast for years the boats of our cruisers have cruized off and in the harbours, and no special fever cases have occurred. At certain seasons Madagascar is a feverish place, but the fever the Malagasy talk about is a fever that goes off in about twenty-four hours. Everybody who has got a cold says he has the fever. Sometimes I know it is much more serious, but it frequently comes and goes in twenty-four hours, so that considering that it is in the tropics I do not think the fever is a great point to consider. Antananarivo is the point which M. Ferry described when he talked about the eagle fastnesses, in which the Hovas lived waiting for the French onset; they had chosen a point lying at a great height. The climate is infinitely better than on the sea coast, and there it is that they command the island. And why are they the dominant race? They are the dominant race clearly because they have the best climate, and in that way they have matured their race over the coast races. The coast races all round are inferior races, because, I take it, of the climate, and because also they are greatly crossed with African blood. The Hova, pure and simple, is a Malay. The coast tribes are Malays crossed with negro, and that is the whole reason why the Hovas are to-day the dominant race in Madagascar. They have kept apart from the negro races, and as long as they do that, they have shown the knowledge of their power, and that is what they will continue to do. I quite agree with our Chairman, that they have made themselves a nation which must be recognized as a factor in all future questions, but I cannot help thinking that the real difficulty we shall have is that having unquestionably beaten the French, they will have a conceit which will probably hinder their advancement. They have got now an idea that they are as good as the French and better. They always have been an extremely conceited race. Wherever you find a Hova you find the most conceited person under the sun, and naturally this is another element in their conceit. They will go about, and will probably have all the names of these long-named battles that Captain Oliver has alluded to on their colours, and when we go with the most ordinary questions to them they will say, "Oh, no, the victors of So and So cannot discuss that."

Admiral DE HORSEY: I am afraid I have very little if anything to say on this subject. My knowledge of Madagascar is limited to a visit to Tamatave, and to having cruized about in those waters. There are one or two questions which I certainly should have liked to ask the lecturer, and perhaps General Willoughby, if he had been here, would have been able to reply to them. I for one feel very sore at British Sound being called Diego Suarez. I noted when senior Officer in those waters in 1861-62, that the French always spoke of it as Diego Suarez. We called it British Sound, and I think we had a right to do so, because it was surveyed and so named by our own Admiralty surveyors. It is one of the finest harbours in

the world, and commands the west and east coast. And as if it was not enough for France to have established herself there, I read in the papers lately that they have established a protectorate over all the Comoro Islands, including Johanna. I think it is a great misfortune that our Government had not a word to say to that. Johanna has been our little coaling station. It almost belonged to England; we established it as a port for our ships for victualling and coaling. The Johanna people look upon us as almost proprietors. The British Consul there has virtually been King of Johanna for the last twenty-five years, and it is with a feeling of soreness I see our Government so blind to our interests abroad, going on with trumpery home affairs, and not knowing what is taking place elsewhere. It does appear that France has been taking a little advantage of us during our troubles in Egypt and elsewhere; this Madagascar business would never have occurred if our Government had been a little stronger, and if our Navy had been a little stronger. It used not to happen. We kept more ships in the Mozambique, and there was never any question of the French establishing themselves there in my time. The points I would like to ask the lecturer are whether it is true that all foreign nations are to deal through the French agent at Antananarivo. It is no use to say they have not a protectorate if they are going to compel all foreign relations with Antananarivo to pass through their agent. I should also like to ask whether the establishment ceded to them in British Sound means any sovereignty over that port. If it does not mean sovereignty, if it only means that they may have a coaling station or any other station they may like to have, I do not think it is of any consequence, but if it is sovereignty, I would hold it as a very serious matter. Here we have Mauritius, only some 400 miles distant from Madagascar, and dependent upon it for supplies. It is only a speck on the ocean compared with this enormous continent, for it is not an island but a continent 900 miles long, and when our gallant Chairman spoke of the climate as being indifferent, I think he overlooked the fact that in a large country like Madagascar the badness of climate is chiefly confined to the sea shore. I have always heard that at Antananarivo the climate is good. It is an enormous island, with every sort of climate, in some parts with mountains 7,000 or 8,000 feet high, so that you may almost choose your climate. I am sorry I cannot add to the information the lecturer has kindly given us, but as I started by saying, I have not had the advantage possessed by our gallant Chairman, of having visited the interior of the island.

Captain PASFIELD OLIVER: I think the best answer to Admiral de Horsey's questions would be made by General Willoughby himself, who has lately arrived from Madagascar as the Ambassador of the Queen of Madagascar. He wrote to me only a day or two ago, saying he was very sorry he could not be here to-day, because he was still down with Madagascar fever, but that next week or the week following he would be only too glad to be present. Under those circumstances I hope that we shall be able to get up an audience if this discussion is adjourned for his presence. I am sure there are a great many people who would have been here to-day if they had thought General Willoughby was to be present. My lecture has been drawn from sources which are open to everybody, the newspapers, from carefully reading up the subject, and from correspondents in the country, but none of this correspondence gives me the information which naturally General Willoughby has kept to himself, and I think it would be a good opportunity to hear General Willoughby on the subject. I shall ask the Chairman to propose Wednesday week for the adjournment of this discussion, when the General, as Ambassador, will be able to speak positively as to the claims of the French to Diego Suarez Bay. I have read the treaty, and according to my reading I think they have only a right to form coaling stations there. I do not suppose that they will ever have the right to fortify, and from information derived from my missionary friends and other correspondents in Madagascar, I certainly think that that is what the Hova Government means. I know the Hova Government are indignant at the idea that the French can possibly exercise any *protectorate*, and since their Queen has been allowed to be Queen of the whole island, the parting with a single inch of their territory has been a thing that they would die for. They simply allow the French, as far as my understanding goes, to form coal depôts and places for repairing ships. The limits are very strictly laid down in a letter which is attached to the treaty,

viz., four miles to the north of the deepest inlet of Diego Suarez, and one and a half miles west and south. That gives the Hova full access to the remaining portion of the peninsula, in which are several other harbours, one of which Captain Wharton, the Hydrographer, specially pointed out as being a famous harbour, and really more useful almost than Diego Suarez. With regard to the entrance to Diego Suarez, I am not a sailor, but I think Captain Boyle will confirm me when I say that he was outside Diego Suarez for some time without being able to get in, the entrance being so low and difficult to make out. There is a great equatorial current and south-east trade, and on the west side of Cape Amber, as far as my knowledge goes, you are quite out of that. There are hills close by, outside the French boundary, from which you can command the whole of Diego Suarez Bay; the Hovas have only to start a fort there, and I believe they can overlook the whole of the inlet. There are heights called by thoroughly English names—Dover Castle, Windsor Castle, and so on—all within range of the gulf of Diego Suarez, and outside the limits which the French propose to keep to themselves. M. de Freycinet, a first class statesman, has had a very difficult task in getting his countrymen to get away from Madagascar, and has had to study their susceptibilities. It was M. Jules Ferry who started the idea of Colonial extension and the conquest of Madagascar, whilst I do not think M. de Freycinet will attempt it. There is no doubt, however, our Government ought to be alive to the important events developing in the Indian Ocean, and certainly our naval forces in those waters should be at least equal to those of the French. In my paper I have given the number of ships which were there, and though Admiral Hewitt was perfectly prepared, had he had the chance, to go in at his vastly superior opponents, as Captain Johnstone was at Tamatave, the forces were quite unequal at that time, and the British squadron, now under Admiral Sir Frederick Richards, ought certainly to be brought up in strength and number of guns to match those that the French can bring against us.

THE CHAIRMAN: There is one point which I omitted, but the lecturer has gone a little into it, which is this, that Mauritius and Bourbon are more or less dependent on Madagascar for their provisions. The products of Madagascar are very remarkable. I have got a paper here which will give you a list of them. They do a large trade in the export of cattle, and, as I say, Mauritius and Bourbon are more or less trusting to them for their best supply. That is one reason why we should never let Madagascar go out of our hands. Before I sit down you will allow me to give the thanks of this meeting to Captain Oliver. I am sure we are all very much obliged to him for his kindness in reading the paper to-day, and that we shall all receive very great instruction from it.

Adjourned Discussion, July 21, 1886.

THE CHAIRMAN (Admiral Jones): Ladies and gentlemen, exactly a fortnight ago we met here to hear a very clever paper which was read by Captain Pasfield Oliver about Madagascar and the affairs which have recently gone on there. After his lecture we had a short discussion, but it was apparent to everybody that we could not do very well unless we had General Digby Willoughby present, who personally conducted a great many of the affairs that went on there, and was perhaps the only one person who could give us any real information. I am glad to say the General is now present. I am sure we are all delighted to find him safe and sound after all his adventures and in very fair health. Before I open the meeting to-day, I would like to remark on a few dates which will elucidate matters very much, and make us understand more thoroughly everything that is said. Madagascar was discovered by the Portuguese in 1506; King Emmanuel of Portugal in 1509 sent Lopez de Sequera and next year another Officer to report on the country and organize an establishment for trade. The son of a great chief was taken to Goa and also a great many of the natives for the purposes of education, and religion was introduced. They seem to have lasted a great number of years, but to have eventually died out, and in 1595 we find the Dutch founding establishments in

Madagascar, and the remains of those establishments exist to this day. In 1643 the French founded a "Société de l'Ouest" to trade with Madagascar under the patronage of Richelieu, and they established a Colony at Port Dauphin. They were then about 150 in number. The first French Governor was the Count de Flacourt, a very able man. He seems to have conducted the work remarkably well there, but nevertheless the Colony gradually got worse and worse, and eventually disappeared. But a curious thing occurred, that while that Colony was existing, several Frenchmen deserted and went to the English Colony, which nobody in England seems to know anything at all about. They had 400 men established at St. Augustine on the west coast, and when the Frenchmen arrived there they found the English Colony had disappeared, but there were 400 graves in the graveyard, and the few that survived found their way to India. The French finally quitted in 1672. In 1750 the French got possession of the Island of St. Mary, which was ceded to Louis XV, but the Governor and his people were all assassinated. In 1773 a Pole, Benyowsky, had a romantic kind of passage there. He was declared to be the son of a native, and was a very clever and able man, and he did remarkably well, and after some years in Madagascar, he went on the Continent of Europe and was very well received in France and many other places; but, strange to say, when he returned to Madagascar, he was shot by a French soldier in a fight, and that finished his career, which was a very remarkable one. In 1810 the English took Mauritius and Bourbon; troops were also sent to Foulle Point, and Madagascar was taken possession of by military occupation. This went on till 1817, when Madagascar was declared to be an independent country. Governor Farquhar came over from the Mauritius; they had a large assemblage of people, and the island was formally ceded to Radama I, and it has remained to Radama and his descendants from that day to this. The present young Queen is a lineal descendant of Radama I. In 1842 the French claimed the northern point, Cape Amber. Up to that time all their proceedings had been down at Port Dauphin, but now they claimed what was then called the English Sound—that was the name on the chart. After the war of 1810, Madagascar was, without question, English by right of conquest. Our troops were sent there and they occupied the positions, and our friends the French at that time certainly had no right of any sort or kind; but they made a sort of treaty with the Sakalavas, and they say, though we have had some difficulties about that point, that the Sakalavas yielded them the northern part of the island. On that question there has been a great difference of opinion, but out of that arose the war which is just over. They kept a diplomat in Madagascar. Now the difference between a consul and a diplomat is rather a curious one, because the diplomat has access to the ruling power and the consul has not, but they were the only Power that did keep a diplomat, and they had a good many quarrels even in my time with the natives while I was there. They eventually claimed the whole of the northern part, and hence came the war. I am not going to enter into the question of the war, as my friend the General is here, who will tell us a good deal about it. I merely mention those dates to show you that the matter has gone on from the days of Richelieu till now, and that the French were the fourth people that came and by no means the first. I will now ask Captain Oliver to state as succinctly as possible anything that he may have to say in reference to the discussion that took place on the last occasion.

Captain PASFIELD OLIVER: With the permission of the Chairman, I will recapitulate the chief points of the paper read the other afternoon, and also some of the questions that were asked by the gentlemen then present, in order that General Willoughby, who is here this afternoon, may be able to answer them. My paper consisted of a simple narrative of the operations in Madagascar from 1883 to 1885, which I may say was based almost entirely on a Blue Book which was drawn up by Major Cooke, of the Intelligence Department, and for which I now offer him my sincere acknowledgments. I had long been engaged myself in drawing up two large volumes,¹ but I found Major Cooke's abridgment was much more to the purpose

¹ Each volume contains over 560 closely-printed pages, besides numerous detailed maps. The mass of this material was placed by me at the disposal of the War Office. It represents information collected during the quarter of a century.

than my detailed and very voluminous papers, and therefore I made no scruple in making considerable use of Major Cooke's able *précis*. One point on which I laid special stress in my paper was this, that when the French made war their informants out there advised their Government at home badly as to the means and the ways which were needed to conquer Madagascar. M. Ferry's Government was very anxious to expand the French Colonies, and there were some ambitious Frenchmen in Madagascar who were only too glad to attract M. Ferry's schemes in that direction. But they must have badly informed him as to the numbers required, so that when poor Admiral Pierre was out there, I do not think he ever had a thousand men whom he could have landed apart from his ships' companies. Of course along the coast the French naval force was sufficient, but they never had more than a thousand effective¹ regular land forces (at all events at one locality). The consequence was, all dreams of passing up to Antananarivo were impossible. I have some maps (exhibited on the table) showing various routes. One, published with the paper, illustrates the road from Mojangá, which was the first place Admiral Pierre took, up to the capital, and although that is a tolerably easy country in spite of the length, it would have taken, according to the best English authorities—and the Duke of Wellington was one of these—the Duke of Wellington put down that from 10,000 to 14,000 would have been required to march on Antananarivo in the year 1845, and therefore it was impossible for the French to think of advancing up with less than 5,000 or 7,000 men. But, as I have said before, I do not think Admiral Pierre (or any succeeding Admiral) ever had a thousand men to put on shore apart from his ships. We all know that poor Admiral Pierre's health was declining; in fact, the climate killed him, and his successor, Admiral Galiber, was on most friendly terms with Captain Boyle, who was here at the last meeting. Admiral Galiber wrote and said he could not advance to the interior with less than at least 3,000 men; the following year it was 4,000 or 5,000 men, and as the Malagasy troops became organized under the superintendence of General Willoughby, the number of land forces required must needs be increased. That is the sole reason why the French never advanced beyond the coast. The Bishop of Mauritius, at the last meeting, thought that the Mauritius coal merchants would suffer by the mail steamers and men-of-war coaling at Diego Suarez instead of at Port Louis. He hoped also a field would be opened out for the emigration of Creoles from Mauritius and Réunion. I am sorry for the coal merchants of Mauritius, but I do not think the treaty will much affect them. I think the English trade at Madagascar, now that the country is opened, will do Mauritius a great deal of good. As for the field of emigration for Creoles, it is very curious that the Creoles could not be got to emigrate there before the war, but as I understand the present Government of Madagascar is willing to grant land to respectable emigrants upon the island, we must hope that a new era will set in. Admiral De Horsey and Captain Boyle both felt rather sore at British Sound being called Diego Suarez. The name Diego Suarez Bay does not occur on any older maps, although certainly during the 18th century it was applied simply to the two islets and the small indentation outside the very deep inlet which we at present call British Sound. Captain Owen, who surveyed that coast in 1824, was really the first discoverer of the deep inlet called by foreigners Diego Suarez. He first surveyed all its bays and he gave it the name of British Sound. The names English Bay, Irish Bay, Scotch Bay, Welsh Bay, were all very well for purposes of survey and of identification at the time, but now that the Malagasy have become an independent nation, I think the real native names will be resumed and should be resumed. I think the Geographical Society now prefer, instead of having such names as Smith, Brown, Jones, Robinson given to capes, inlets, and bays, that the native names should be ascertained as soon as possible and given to them; it is much more satisfactory to everybody. The Indian Survey name the peaks of mountains A1, A2, A3, and so on, till the native names can be properly ascertained, and very nice quarrelling they have

¹ The actual numbers shown on paper were more, but of these from 20 to 25 per cent. were non-effective invalids. At the end of the war, however, Admiral Miot had 2,500 land troops.

lately had over those native and other names.¹ Captain Boyle thought the English failed to comprehend that Diego Suarez commanded the trade on both sides of that island. Now, according to the treaty made between the French and the Malagasy, as far as I understand—I can only speak with great deference, because the gentleman who made the treaty and signed the treaty with Admiral Miot is present and will tell you what it was, and I am sure Admiral Miot is the last person in the world to repudiate a treaty which he has signed—I repeat, according to that treaty, full access is given along the isthmus to some capital harbours on the west coast of Madagascar just inside Cape Amber. According to Captain Wharton, one of them, which rejoices in the name of Port Robinson, is admirably adapted for steamers wishing to await the gales that blow round Cape Amber, lying on the leeward side. The entrance to Diego Suarez is on the windward side, and it is not, I am told, always easy to make out the entrance. It is a splendid harbour, and will shelter all the navies in the world if you once get them into it. No doubt one great advantage of the French holding that bay will be that they will beacon it and put a lighthouse there, and will erect some hotels, which visitors from Mauritius, Bourbon, and Réunion will go to as a watering-place. Captain Boyle also remarked that the climate is not so bad, as boats have been away for a fortnight at a time on the coast, but have not suffered from fever. But then they did not land there, and it is the fact, I believe, that his First Lieutenant who was away cruising did die of fever a few months afterwards. I find "Diego Suarez" marked on nearly all the European maps, except the English Admiralty charts. You may say "What's in a name?" If we take possession of British Sound, well and good, let us call it British Sound; but as we have not got possession of it, I think the best thing will be to call it by the Malagasy name, which I believe is Antomboky.

The CHAIRMAN: "Diego Suarez" shows the original discoverer.

Captain OLIVER: The name "Diego Suarez" was given in memory of the great Portuguese navigator who discovered Cape Amber; but I do not think the first voyagers knew that there was a deep inlet inside, they only passed by the entrance. Admiral de Horsey was very anxious to know whether the French were going to exercise sovereignty over the reservation at Diego Suarez, or merely to erect coal depôts and sheds there. That, of course, it is impossible to say, but I dare say General Willoughby will be able to tell us, as far as diplomatic reticence will allow him, what the intentions of the French are. I think what I have said is a fair summary of the information asked for by the different speakers at the last meeting, and I myself have some questions to ask General Willoughby. I am sure the audience generally will be glad to learn from him information on the following points, so far as he can give it to us. The first is as to the numbers, state, and armament of the Malagasy forces when he took up his appointment there as Adjutant-General, in 1883. Next, if he will tell us how he set to work to put the raw material into shape, and to organize the inchoate mass of untrained men. Thirdly, how he managed to overcome the inveterate obstruction and obstinate prejudices of a peculiarly difficult race. I believe he got over this by insisting on absolute authority. Fourthly, we should like to hear the results of his organization, as exemplified by Colonel Shervinton's expedition. Colonel Shervinton was an English Officer, a very gallant young man,² who conducted that expedition up to the north-west. I hope General Willoughby will be able to give us some details about his expedition. Next about the blockade of Mojangà, which after the French took, they never seem to have been able to pass beyond; in fact they were continually attacked there, as far as we can make out from the small amount of information that has reached this country. And lastly, as to the complete repulse of the French, who were driven back on their lines to Tamatave, in September, 1885, just before peace was made. A more delicate inquiry, on which we cannot expect any decisive answer, is the future of Diego Suarez, the actual position of the French with regard to that bay, and the intentions of the Hovas regarding availing themselves of the access across the isthmus

¹ Notably the late discussions about Mount Everest.

² Colonel C. R. St. Leger Shervinton was Military Secretary to General Willoughby, and formerly Adjutant to the Cape Mounted Riflemen.

to the harbours on the west side. There is another very interesting point which interests us more than almost anything else, although not peculiarly Madagascar. We have a little island called Mauritius, some 400 or 500 miles east of Madagascar, which is totally dependent on that country for supplies. That island, in obtaining which we spent a great deal of blood and money, is dependent upon the "Messageries Maritimes" for its communication with England, but the "Castle" mail packets have, I believe, often at a loss to themselves, kept up a communication between that island, Madagascar, and the Cape, which has enabled a great deal of independence to be preserved by our Colony, otherwise wholly dependent on the French for its communication. Had Madagascar been conquered by the French, Mauritius would have been entirely cut off, but as Madagascar remains an independent country, we now have an access to Africa, and I hope also that a telegraph line may be established, which need not be dependent on the French flag in any way, especially since quite lately the French have obtained a protectorate (as it was quite within their rights to do) over the Comoro Islands; therefore from the north of Madagascar to Zanzibar is, you may say, French territory to a certain extent. But by Madagascar being, as I hope, under a certain amount, even yet, of English influence, certainly independent lines of telegraph through Madagascar and across to Mozambique may be of the greatest importance to Mauritius, and keep our Colony, our fine harbour there, and our fortified position, the key of the Indian Ocean, in independent communication with the mother country.

Colonel BAYLIS: I would venture to make a few remarks with regard to the treaty. I have only had it in my hands a short time, but it is so plain in itself that I may safely put my construction upon it, and inasmuch as some questions were asked at the last meeting as to the effect of this document, to what extent it gave the right of interference of France, I think my remarks may be pertinent to the lecture. This treaty, dated 17th October, 1885, provides for placing the French representative in the position of a medium between Madagascar and foreign countries. By Article 1 it is provided that the French Republic will represent Madagascar in all its foreign relations, and the Malagasy abroad are to be placed under the protection of France. I understand that the French are merely to be the medium of communication. I think we must concede that that is so. Article 3 is very clear to show that this is limited to the French as merely the medium between the foreign Powers and Madagascar. It enacts that the President, representing the Government, will preside over the foreign relations of Madagascar, without interfering in the internal administration of the dominion of Her Majesty the Queen. And I have no doubt, whoever acted for Madagascar, carefully and advisedly put in those words, as showing that there was to be no interference whatever in the internal administration of the country. Article 9, I think, also gives a meaning to the treaty, for it says that until payment in full of the above sum of 10,000,000 francs, the French shall occupy Tamatave. Now if it had been intended that she should occupy any other place at any other time, it would have been so expressed. Therefore it is clear that, upon payment of this money, they were to withdraw from Tamatave, and they were not to occupy any other place except Diego Suarez, mentioned in Article 15. Then Article 11 is one which I call a defensive article. The Government of the Republic undertakes to lend assistance to the Queen of Madagascar for the defence of her dominions. Now if the language had not been very guarded, that might give a power of interference, but I do not think that this article does, without a request made by the Malagasy Government. It does not say that they are to interfere, but it says to "lend assistance." One knows very well that we do not lend people things unless they come to us for them, and I think it must be very clear indeed that before the French interfere they must be asked to give assistance. I admire the way in which the treaty is drawn; it is most guardedly drawn. Then we go on a little further to Article 15, on which some little doubt might arise, and by which the Government of the Republic reserves to itself the right of occupying the bay of Diego Suarez, and of creating these "establishments at its convenience." Now what does that mean? I think a question arose as to what the French might do there under that article, but having examined the treaty, I think it is manifest that this article was not intended for any other purpose than that they should occupy Diego Suarez for mercantile pur-

poses, and not for the purpose of interfering in any way with matters of government. I admit that that article would under ordinary circumstances, if it stood alone, let the French in, generally to occupy for any purpose, but the other parts of the treaty are so clear and distinct that it cannot be held to mean anything further than that they are at their own convenience to occupy it, and taking it upon the whole I think that it cannot be intended that they should do it for any other but peace purposes, and certainly not to interfere in the internal arrangements of the kingdom. I arrive at my construction of the document from my own reading of the document as contained within its four corners, but as some question might arise hereafter, it might perhaps be extremely useful, if General Willoughby felt at liberty, to explain what is the meaning and intention of that article, because at some future day, if it should be called in question, his interpretation of it would have great value.

Bishop RYAN:¹ I see that in the treaty the Queen is spoken of as the Queen of the Hovas, and not as the Queen of Madagascar. Her position in that respect seems to have been put a little on one side, and I should like to have some information on that point.

General WILLOUGHBY: Mr. Chairman, ladies, and gentlemen, I feel very flattered in being asked to address so distinguished an audience, especially as I feel certain that many who have come here to-day have given up some other very important engagements for the purpose. Bishop Ryan says that the Queen is only mentioned in the treaty as the Queen of the Hovas. That is a mistake, because if you look to Article 11 or 12 you will see that she is spoken of as the Queen of the whole island, which is one great point in the treaty. I will not give you a geographical description of Madagascar, because I feel certain that everybody present knows exactly its longitude and latitude, although that is a point upon which in some instances people are even now rather hazy. I was introduced to a gentleman by a friend, who in a stage whisper mentioned that I had come from Madagascar. He received me cordially, and after we left my friend told me that he turned round to him and said, "Can you tell me where Madagascar is?" I can only say that I wish it to be clearly understood, that when I left England to join the service of Her Majesty the Queen and His Excellency the Prime Minister, I had no intention of fighting the French. My appointment was given long before war was declared, and when I arrived in Madagascar and these operations had commenced, I thought I could not very well resign my appointment, and I therefore determined to see them through it. On the 15th of November I arrived at a place called Mahanoro, which had just been bombarded by two French ships, but owing to most of the shells being blind, the damage done was not very great. I went up to the capital as quickly as possible. I unfortunately was not able to get the number of men I required, and having only ten bearers, it took me nine days. When I arrived at the capital, my appointment had to be confirmed by his Excellency the Prime Minister. I found on arriving at the capital that there was plenty of raw material, and that the people were determined to resist the French demands to the utmost. It being impossible to organize at once the force at my disposal, the only thing that I could do was to drill them as best I could in small detachments, and send them down to the front. I am asked how I obtained the confidence of the natives of Madagascar, and especially of Her Majesty the Queen and His Excellency the Prime Minister? I can only say from first to last that Her Majesty and His Excellency have been my firm and staunch friends, although I have the pleasure of stating that I think that at the present moment I am the most disliked person in Madagascar, simply because I have tried to do my duty. One instance of this arose after I had the honour of bidding Her Majesty goodbye. I was going down to the camp, for after I left a sort of jealous feeling broke out amongst the Malagasy, who did not understand the difference between Vazaha and Vazaha (Europeans). The moment I got down to the camp rumours became rife that I was going to play the Malagasy false. The Queen, on hearing of this, turned round and said to her courtiers that I was really a friend of hers, and that

¹ Formerly Bishop of Mauritius.

anybody who spoke a word against me spoke it against herself. Of course when news of this reached the camp it to a certain extent helped my position, but still even at the camp I had a great many difficulties, as you may understand. The Malagasy are really very reticent in all private matters, and especially with regard to fortifications, and there was very great difficulty in my being allowed to see all the camp. There were little places which they thought I would not spot at the moment, which they really tried to hide from me. To give another instance, whilst reconnoitring I saw a place which I thought if an attack was made would be very convenient for a pontoon, for bridges, and also for artillery, and I pointed out that if the French placed their guns in a certain position, they would be able to silence our fire. This did not quite meet with the approval of the Malagasy, and they objected. I held a council of war and said, "You see I come down now as a friend of Her Majesty the Queen and of His Excellency the Prime Minister, and I can only tell you I must not treat you as children; I am simply here as a military adviser. If you do not like to accept my advice, the only thing I ask is this—that if the French attack there and you meet with disastrous circumstances, you will give me a letter that I can show to the Queen and to the Prime Minister, in order to prove that my advice has not been taken." After this there were some small reconnaissances, and I think some exaggerated reports got up to the capital that I had exposed myself a little to the enemy's fire. Public feeling then immediately turned, the Malagasy looked upon me as their defender, and I obtained to a certain extent the whole of their confidence. After being about three months in the camp, I went up to the capital; I then found that troops were being sent out to Tonquin. At that moment I had one or two offers of service from different comrades and also from friends. The services I accepted were from Colonel Shervinton, who then came to me as Major Shervinton. I can only speak of this Officer as one that served me most loyally and faithfully, and has done extremely good work in the Malagasy service. Also I must speak in high terms of praise of my other Officers, viz., Major Graves and Captain Sisson. As soon as Colonel Shervinton arrived, I formed a camp of 20,000 men at Antananarivo. This again would, I might say, have been a troublesome job if it had not been for the support we received from the Queen and Prime Minister. Nobody, except those who have seen Eastern countries, will know the staunch way in which the people will hold to their own ideas, and one of the ideas of Madagascar is, that they have what they call musical honours: that is to say, the 15-honour man, the highest, has 15-honour music, the 14-honour man 14-honour music, and so on. Now, when I formed my camp I asked the Prime Minister to abolish musical honours, because I found that whenever a 15-honour came on to the parade-ground, no matter what the regiment was doing, the moment musical honours began to tattoo, words of command were stopped, and everybody saluted the 15-honour music. This would never do, and I wrote to the Prime Minister and asked him to stop all musical honours, which he did. The men there were drilled for six weeks. It was really a camp of exercise; they went through regimental drill of all sorts, signalling, telegraphing, and really were preparing for an expedition to the north. The expedition to the north was composed of a column of 1,000 men, which was under the command of Colonel Shervinton, although the immediate command was given to a Malagasy. The object of that column was simply to strike a blow at the Sakalavas. The Sakalavas we considered as rebels, and orders were given that they should be punished to the utmost. Colonel Shervinton, when he got up as far as Jangoa, burnt Jangoa, and was going on towards Ampasindava Bay, when he was attacked by a lot of Sakalavas with their allies, the French. Of that battle and of that fight I will leave you to read the account of Admiral Miot, and also the account given in the English papers and in the papers furnished by Major Cooke. After that I also accepted the offices of a gentleman called Captain Graves, now Major Graves, who did excellent service in drilling the men in gunnery. He too came from the Colonial forces, and both of them before they came to me had been offered appointments, either by Sir Charles Warren or Colonel Carrington, to join the expedition to Bechuanaaland. I can only say that both these Officers, by their courtesy to the natives and by the way that they performed their duties, have endeared themselves in every respect to the Malagasy nation, who have really a very high opinion

of them. After the Battle of the Sâhamâfy, I regret to say I fell short of ammunition, and I had only at that moment 100 rounds per man. This induced me at once to attack Tamatave for a strategical reason, because I was afraid that Admiral Miot, finding that my fire was slackening, would make another attack and compel me to retire from the camp. I therefore attacked Tamatave really in hopes of making him believe that I had abundance of ammunition, on the ground that no man in his senses, unless he had ample ammunition, would attack a place which otherwise he could not hold a single day. After this there were some private overtures to the effect that France would be willing should the Malagasy treat with them. When I came up to the capital the Prime Minister asked me if I would go to treat with Admiral Miot. I told him at the time I did not think Admiral Miot had the power at the moment to receive me, but I had no doubt he would telegraph the contents of the letter which the Prime Minister wrote to him to his Government in France. The French Republic replied that they would send out M. Patrimonio to meet me, and I went down to Tamatave. When I arrived there, I can only say that I was treated as only a French gentleman can treat another, with the most perfect courtesy. The moment I arrived at Tamatave I was accorded all honours, and we commenced to treat. I can only say from the conversations I had with Admiral Miot, I am certain if Admiral Miot had been there three years ago, there would have been no war at all—that everything would have been settled most comfortably, and really most peacefully. I must also state that there was a great deal of unpleasantness about Admiral Pierre, but I have talked to many gentlemen who had found him the most courteous of men. When he was at Tamatave, I know that he wrote a letter saying that he was ill, that he was dying, that he could neither see the land nor a chart, and he was badly advised. I am sure that when in health there was no one more courteous than Admiral Pierre. Admiral Galiber relieved him, and I believe if it had not been for the instruction that he had received from his Government, very likely everything would have been settled. After Admiral Galiber came Admiral Miot, who I have no doubt received instructions to make peace on the best terms he could, and I can assure you that Admiral Miot did the best he could, and that our relations personally were all that I could wish or desire. With regard to the treaty, I can only say I would refer Colonel Baylis to the appendix, which was also signed by Admiral Miot and M. Patrimonio. In that the powers of the Resident are clearly defined, and the land at Diego Suarez is limited to $1\frac{1}{2}$ miles to the south and east and 4 miles to the north of the extreme point of the bay towards Cape Amber. With regard to Article 11, you will find in the appendix that assistance will be given by France to the Hovas only if "it is demanded." With regard to Diego Suarez Bay, the French have not told me what they are going to do, but I can only tell you what was understood in a friendly spirit when we talked the matter over, that is, that they wanted it simply for a naval coaling station—for this reason, that during the war with China, Hong Kong being neutral, they had only one harbour to go to, and they wanted a port so that in case of neutral Powers not supplying coal, they could have their own coal there, and it is no doubt a very fine harbour. Réunion is very difficult of access; there is always a surf there, but here there is a natural harbour, in which they could store and whenever they choose. With regard to the operations there, I think that till Admiral Miot came, although there is no doubt the French had not sufficient power, instead of trying to take Sâhamâfy, which was naturally very strong, they ought to have attacked my flank at Ivôndrona. From Tamatave to this place the road is very easy, and there would be no difficulty in carrying guns on mules; and if they had built a fort at Ivôndrona, they could have covered the advance, and if they had taken Masoa, they would have either compelled me to attack them in their entrenchments, or they could have cut off the Army of the East, and I should have had to retire into the interior. Admiral Miot saw that and commenced it. I can only again acknowledge the courtesy I received when I was at Tamatave, and from the friends I have in France. I trust the treaty now made will be one that will be long continued, and that there will be the most friendly relations between France and Madagascar. I am certain France will find in me a warm friend if she will only carry out the treaty on her part with good faith. I am assured the

Madagascar Malagasy will strictly adhere to the letter and intention of the document. There is one other subject I wish to speak upon. Before I came away Her Majesty was good enough to make me Commissioner of Crown Lands. There is a lot of land in Madagascar, which is three times as large as the United Kingdom, but any stranger going there for the first time would find a little difficulty in getting land, because you want two persons to agree to it, and there might be some difficulties perhaps with the Governor. Now if any one who has about 400*l.* or 500*l.* would be willing to settle there and would give me names, I would submit them to the Prime Minister and would have a certain amount of ground surveyed, so that those who wanted to go out might have an opportunity of entering on their ground at once. Madagascar is so large that there is ample room for everybody. It is a very rich country. The exports are wax, sugar, and rice. I believe there is a great deal to be done in manilla, and certainly a good deal in sugar. Labour is cheap there, and I feel certain that Madagascar will produce sugar much cheaper than Mauritius at this present moment. Manilla will not pay under three years. Tobacco, I think, will pay. I shall be very glad to see any one upon this subject, and if I can represent them in any way, you may be perfectly sure I shall only be too pleased to put my services at their disposal.

Major COOKE: I should like to ask General Willoughby one question: is it not a fact that France, since that appendix to the treaty was concluded, has disavowed the appendix? The appendix was certainly concluded with M. Patrimoine by the Malagasy Plenipotentiary, but did not France at once officially disavow it? This question interests England principally in its political aspect. I am not at all certain that the appendix holds good now, for I have seen it publicly stated that France has declined to be bound by it.

General WILLOUGHBY: The only information that I can give on that subject is what I have seen myself in Major Cooke's papers. This is a political question, and if you will allow me I will not enter into it.

The CHAIRMAN: What is the general opinion of the raw material of the Malagasy as regards the making of a soldier?

General WILLOUGHBY: He is an exceedingly good soldier at the present moment behind earthworks. As you know very well, it takes six years to make a soldier, and after they have been properly drilled, I really should not be afraid to lead them anywhere. They have extraordinary personal pluck, and they will never disobey an order.

The CHAIRMAN: Ladies and gentlemen, it now only remains for me to thank the General for his courtesy in coming here to-day, and for the excellent way in which he has answered all the questions that have been put to him. While I was in Madagascar I formed a very high ideal of the Malagasy. They are a people with a great deal of education; schools are everywhere. They possess the most beautiful language that was ever spoken. Italian is nothing to it. The smoothness of the language is something remarkable, which is a strange thing with, as we thought, an utterly unpolished nation. The higher classes are deeply read. They have libraries that might grace the Prime Minister's library in England. They have books to which they can refer for every single thing, and they read every word of them, and know them. As to the Prime Minister himself, I say, without fear of contradiction, he is the cleverest man I ever met. I have had long conversations with him, and on every single point, especially on political points, I never knew a man who so clearly and thoroughly understood everything as the Prime Minister. He was quite extraordinary in his grasp of intellect, and in his thorough knowledge of what his people could do, how much he could teach them, and where to stop. If everything is allowed to go on in Madagascar as it went on in those days, I am sure, under the auspices of the Queen and her Prime Minister, there is a great future for Madagascar. I am sure you will allow me to thank General Willoughby, in your name, for his courtesy to-day.

Colonel BAYLIS: I shall be very glad to second that, and in doing so I may say that although this island is so near Africa, its language comes from the stock or the root of the Malayo-Polynesian language.

BARNETT'S PATENT WATER-BRAKES.¹

By Mr. FREDERIC BARNETT, C.E.

By the kind permission of the Council I am permitted to introduce to your notice this model, with the object of bringing into evidence the principle of my *water-brakes*; I shall intrude on your patience but for a limited time.

I beg to submit that if my system were applied to ships that go down to the sea, many less would go down *in* the sea, by avoiding collisions, and thus prove the means of saving many thousands of valuable lives and untold treasure.

Is it too much to hope, if such means can be applied to ships to diminish in a great measure the appalling casualties which are the outcomes of collisions at sea—though not guaranteeing perfect immunity—but lessening in an important measure the numbers of ships that yearly collide with other ships, with floating ice, with submerged rocks and shoaling water, by neutralizing the way on vessels, or by almost turning a ship in her own length either to her port or star-board, that the comparatively trifling cost of fitting such apparatus as these water-brakes will not be grudged either while the ships are building or to those already built?

I have reason to believe that should this principle be applied, owners will find ample compensation in reduced rates for underwriting, and in increased profits from additional patronage, especially in passenger ships.

As regards the Royal Navy few words need be said, as it must be self-evident that in warlike evolutions, the facility for rapidly checking speed, and the improved power of turning to the right or to the left in the emergencies of a naval engagement, must prove highly important.

On this subject a paper was read during the last sessional meeting of the members of the Institution of Naval Architects, by Captain Colomb, R.N., the Earl of Ravensworth presiding.

The paper was entitled "*Recent Measurements of Turning Powers of Screw Ships.*" The author observed—

"That increasing attention had of late years been given to the accurate measurement of manœuvring power of steam ships, and more especially to that part of them which embraced the turn of screw steamers when at speed to the right or left of their original path under the action of the helm. The investigation of the nature of the turn might be said to have begun a quarter of a century ago,

¹ Read at the meeting held on 12th July, 1886.

when the increasing length of the war ships made us familiar with two facts, that *considerable space* relatively to the length of the ships and *considerable time* relatively to their normal speed, must be occupied before the ship could make any considerable change in the direction of her path."

Without trespassing too much on your time and patience, I will briefly quote a further portion from Captain Colomb's interesting paper:—

"That the subject has been held to be so important in maritime warfare that for many years experiments have taken place in England, France, and Russia, and that many distinguished names are connected with them in England, some of the earliest were carried out by Admiral Sir Cooper Key; in France and Russia the names of Admiral Bourgois and Admiral Gregory Boutakov; that in France the knowledge had been greatly advanced by MM. Risboecq, Disclere, and Lewal; while in England Sir N. Barnaby, Mr. Barnes, and Mr. Philip Watts, all of the Admiralty, had assisted to clear up many doubtful points."

The above quotations from gentlemen of the profession go far to sustain the argument of the very great importance of any easy and simple means of turning a ship of war, during an engagement or otherwise, rapidly to the left or right. Such means, I submit, will be obtained by the immediate action of these water-brakes, when either one row or the section of a row is brought instantaneously into play; because the momentum of the ship on the one side being paralyzed, while that on the opposite remains unchecked, the vessel will almost turn in her own length, and while there is any way on her, her action will be short, sharp, and effective.

I am also of opinion that when the brakes are applied to the sides of any vessel, in due size and number, the ship will, when required, be brought to a speedy standstill by bringing them *on both sides* into action simultaneously; this operation being easily effected by suffering them to plunge into the water by their own gravity on releasing the chains on which they are suspended. No other apparatus than a few block pulleys and chains are required, hence there is nothing to get out of gear.

The brakes, according to the duty required of them, may be constructed of iron, steel, or other suitable material, of such substance and strength as will enable them to resist the strain to which, when in action, they would be liable. Their form, for choice, will be an elongated square, from about 2 feet by 1 foot to 10 feet by 5 feet, more or less according to the tonnage and speed of the craft, and their relative position will be to the ship's side that the greater length will be nearly vertical. The blades will work on suitable hinges, as shown in the accompanying plate, firmly attached to a strong metallic arm, the end of which will work on a pivot attached to the ship's side, strengthened in the interior of the bulwarks, where also will be a small drum or winch, on which will coil the chain employed to raise the brakes from action in the water. These in small vessels will be worked by manual labour, and in large vessels, be hitched on to the steam or other suitable power.

When not in action, the brakes will be snugly triced up by their supporting chains into and under a sort of belt, which, while keeping them safe from contact with other ships at close quarters, will also

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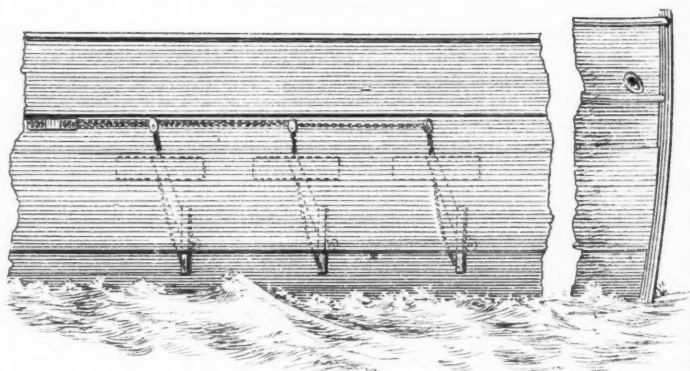
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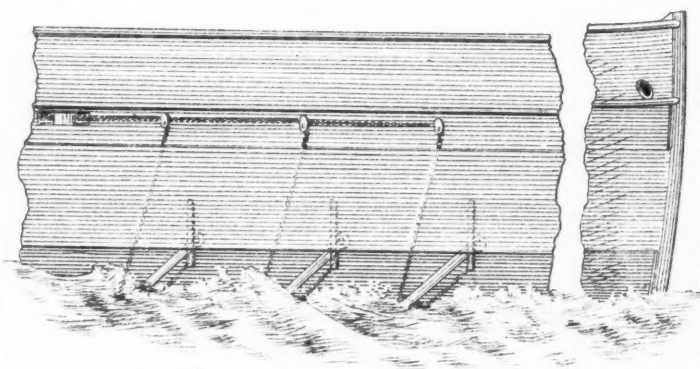
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IMPROVED WATER BRAKES.

TO CHECK THE SPEED OF SHIPS, LIKEWISE TO ASSIST
IN STEERING THEM.



OUT OF ACTION.



A - IN ACTION

secure them from friction when entering harbours or docks, &c.; at the same time, being clear above the water-line, there is no friction with that element.

I should also wish to affirm my conviction, collected from eminent gentlemen of the Royal Navy, that for various evolutions in naval warfare, such as ramming and torpedo practice, the water-brakes will prove of valuable importance.

By the courtesy of the Secretary of the Registrar-General of Shipping and Seamen, I find that the loss in one year of ships at sea, British and Colonial *only* (no foreign or Government ship being included) was 964. This period was from the month of June, 1885, to that of May of the present year, both inclusive. It is quite probable that many (if not all) of these vessels, with their human and mercantile freights, might have been saved, if their commanders had had the power on emergencies of checking speed, or of bringing their vessels to a stop or turning their heads by means of the rapid action of these water-brakes.

My brakes, I believe, are destined to other important applications. Independently of the use above enumerated I may mention that two similar brakes, fitted independently of the others, on either quarter, will in case of accident to the rudder or steering-gear, prove of inestimable value, as the vessel could at once be effectually steered by them, without loss of time; the same, if for the Navy, would serve as auxiliary and fighting rudders.

I am also *hopeful* that by suffering the brakes to descend somewhat lower into the water, till they become nearly in a horizontal position, they will materially assist in counteracting the rolling motion of the ship without other cost than the slight lengthening of the sustaining chains.

APPENDIX.

Extract of a Letter.

Broadway Chambers,
Westminster, S.W.

DEAR SIR,

Having examined the working model of your water-brakes, as to the merits of your plan there can be no doubt that as a means of bringing a ship to a speedy standstill your arrangement, properly worked, would be efficient.

Dear Sir,

Yours very truly,
(Signed) E. J. REED.

F. Barnett, Esq.,
106, Queen Victoria Street, E.C.

1136 COLONEL MULOCK'S PATENT FOR DRIVING PUNKAHS.

10, Wilton Place,
Belgrave Square, London,
September 23, 1886.

DEAR SIR,

I have seen your water-brakes, which I consider both original and effective.

Yours truly,

F. B. HEATHORNE,
Captain.

Frederic Barnett, Esq.,
106, Queen Victoria Street,
London, S.E.

COLONEL MULOCK'S PATENT FOR DRIVING PUNKAHS.

(Read by Colonel T. EDMONDS MULOCK, C.B., at the Meeting on
14th July, 1886).

THIS is an invention for driving punkahs by means of a wheel attached by brackets to the outside wall of a building. A crank is fixed by brackets at the required height, and is set in motion by the wheel below by means of a perpendicular rod. A horizontal driving rod passing through an aperture in the wall is pivoted on the arm of the crank.

The punkah is hung by three rods from a beam in the roof of the apartment, and is acted on by the centre rod pivoted in a slot or jaws in the horizontal driving rod, which is propelled backwards and forwards by the action of the crank. This horizontal rod being elongated and run through supports, can be made to drive several punkahs. Punkahs in adjoining apartments can also be acted on by a shafting from the pivot of the centre crank being attached to similar machinery for the rooms on either side. According to the present mode of punkah-pulling the air is only disturbed on one side of the punkah, which merely swings back from its own weight a few degrees beyond the perpendicular, whereas by this invention the entire apartment will be ventilated.

The model before you is on the scale of 1 inch to the foot, and a room 30 feet by 20 feet is shown as worked by hand as if it were a room in a bungalow. I calculate that one coolie would be able to work three large punkahs either in line or abreast, so that even in private houses there would be a considerable saving in labour with double the amount of air-disturbance. But this invention is peculiarly adapted for ventilation of hospitals, barracks, and other public buildings. Up to the present I have been unable to ascertain what sum is paid yearly by the Indian Government for punkah-pullers. I am, therefore, obliged to make a rough calculation founded on the experience of civil and military Officers who have served in India. Let us take a barrack-room for 80 men, *i.e.*, 40 beds on either side: give 4 feet for each bed, or $2\frac{1}{2}$ the bed itself and a space of $1\frac{1}{2}$ feet between; such a ward or barrack would be 160 feet long. Then *five* punkahs hanging as shown in the model, would serve to ventilate the whole.

The motive power for working this invention can be supplied

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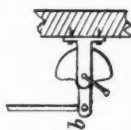
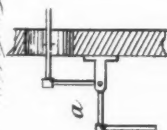
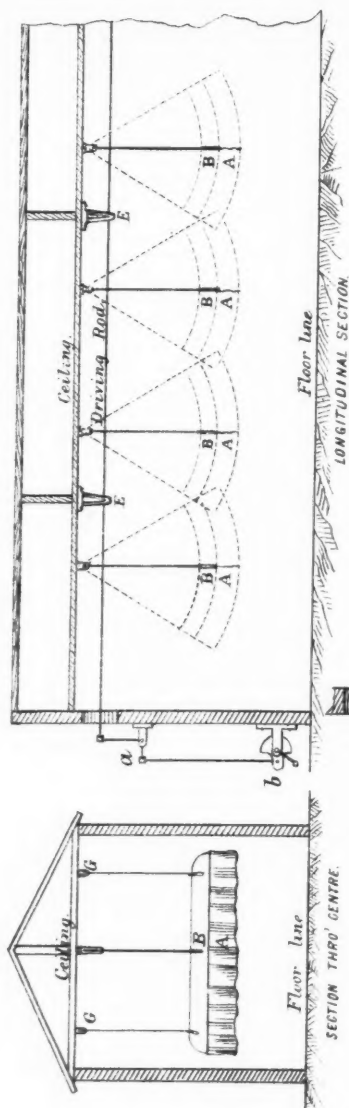
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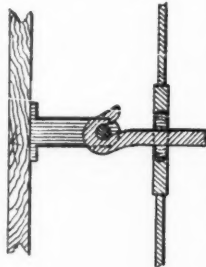
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Jaw in which centre rod works.



in several ways, either by a small engine or by horses or bullocks. I take it that bullocks would be found to be the cheapest mode of working in India where water-power is not easy to procure and coal is expensive. One bullock working (as in a threshing machine) would keep in motion the five punkahs for ventilating the above-mentioned ward 160 feet long for 80 men, that is to say, with a relay of two bullocks and two bullock drivers for eighty beds. According to the present system I believe I am correct in stating that it requires *two* punkahwallahs for every *ten* beds. Then, according to that computation, let us see what the Government would save by adopting this invention.

A ward or barrack for 80 men at present requires Rs.

16 coolies at Rs. 4 a month = 64

Against which set 2 bullocks, Rs. 20, 2 drivers,

Rs. 8. = 28

—
Saving Rs. 36 a month.

In most stations punkahs are required for eight months in the year; but let us take it at six months only, then the saving for giving ventilation for 80 men for that period would be 216 rupees; but we have upwards of 50,000 European troops in India: knock off 5,000 in the hill stations, &c., and we have on 45,000 men a clear saving of 121,000 rupees a year.

I daresay many of us have experienced the extremely disagreeable sensation of awaking in the middle of the night bathed in perspiration, with the punkah hanging motionless above us, and the punkahwallah fast asleep outside, and this not once but perhaps three or four times during the night. From what I can learn from Officers who have lately returned from India the same thing still holds good. Everything else has gone on improving in a wonderful manner, yet still the sleepy punkahwallah sits and pulls away at the original supplejack through the time-honoured neck of the broken bottle. Is it not high time that there should be some change in all this, and that some advance should be made towards giving our countrymen in India a chance of a whole night's sleep, and also showing them how it is possible to have ventilation on all sides?

Now, with regard to the probable expense of putting up these fittings, let us take first one room in a private bungalow. It will be seen that the fittings, which are of brass in this model, may be, when full size, equally effective in hard wood and iron, and could be made in any bazaar in India.

	Rs.
Say 4 wooden brackets, with brass sockets	5
Wood in wheel and handle	2
6 yards of $\frac{1}{2}$ -inch iron tubing for perpendicular driving rod	2
Iron crank	2
Horizontal driving rod of wood or $\frac{1}{2}$ -inch tubing	3
Casting or bazaar hand-made centre action	2

—
Total Rs. 16

4 E 2

1138 COLONEL MULOCK'S PATENT FOR DRIVING PUNKAHS.

I am sure that would be a liberal allowance for one punkah, and it will be seen that by elongating the driving rod half-a-dozen other punkahs could be worked at a trifling addition to the expense. Taking it for granted that one coolie could work three punkahs for three separate rooms, let us see what the saving in labour would be.

	Rs.
Cost of putting up three punkahs at outside price for one (<i>i.e.</i> , Rs. 16)	48
Hire of 2 coolies for six months, at Rs. 5 a month....	60
Total	108
Contra—Hire of 6 coolies for six months, at Rs. 5 per month.....	180
Saving first year	Rs. 72

But the saving for the ensuing years would be $72 + 48 =$ Rs. 120, *i.e.*, the first cost of the machinery.

With regard to barracks, hospitals, and other large buildings recourse would be had to either steam, water, or horse-power. Any practical engineer could at once point out the best way of connecting and adjusting the wheels for driving the machinery. Indeed, I thought of having a model horse machine attached to this, but found that it would be almost as expensive to construct as a full-sized machine.

Native workmen are clever at putting up saw-mills. Persian wheels, &c., and iron castings for the required cog-wheels might be made in India. Eventually, perhaps, it might be found that these punkahs could be worked by compressed air, or by winding up a strong spring or a weight with an endless chain. Several years ago when I was in India the East India Company offered a large sum as a premium to any one who would invent a satisfactory punkah, but nothing satisfactory came of it.

I hope the explanation which I have endeavoured to make as clear as possible will have interested the members of this Institution. Doubtless there are members present who have been in India who are in a position to give an opinion as to whether this invention is calculated to suit the requirements for ventilation in tropical climates.

To take down Punkah.

Remove pivot of horizontal and perpendicular rods and unhook from beam.

Wednesday, December 8, 1886.

LIEUT.-GENERAL L. NICHOLSON, C.B., R.E., Inspector-General of Fortifications, in the Chair.

COAST DEFENCE.

By Colonel SCHAW, R.E., Deputy Director of Works for Fortifications.

LIVING as we do in an island, close to a great continent whose inhabitants, warlike and with standing armies immensely outnumbering ours and with navies of yearly increasing strength, may at any time become our enemies, the question of coast defence must always be one of great interest to Englishmen. But apart from the necessity for resisting an invasion of Great Britain by a foreign army, which, however much we may be inclined to blink the fact, is a very possible contingency under the one important condition that our fleet had in some way been disposed of, it is essential for the life of that fleet on which our national existence may truly be said to depend, that secure harbours and naval arsenals and dockyards should be provided for our Navy where ships can be built and fitted out, whence they can issue to attack an enemy, and wherein they can safely repair damages and obtain fresh coal, ammunition, and supplies of all sorts.

I can only lightly touch in this paper on the subject of invasion; that great question has quite lately been discussed in this theatre after important papers by Sir Charles Nugent, by Major Elsdale, and by Admiral Arthur; I would only remark, before passing to the other branch of the subject of coast defence, that in whatever way it can be best accomplished it is our clear duty as Englishmen to be prepared to resist strongly and effectively the landing of an enemy on our shores and his advance on London. It is urged by some that a volunteer naval organization will best effect this object, and that a hostile fleet endeavouring to land an army on English ground would be most effectively opposed by the active attack of numerous torpedo- and gun-boats forming the normal naval defence of every small harbour on the coast, and converging by prearranged signals on any threatened point; others would prefer to use a land organization and to attack an enemy when attempting to land by infantry and machine-guns and light artillery; others again, recognizing the very great advantage which must always rest with the attack, of choosing time and place, and of deceiving the defender by feints, enhanced as it

is by the power of rapid movement irrespective of wind and weather which steam confers on ships—would prefer to trust to a reserved defence, after an enemy had landed, and when he was committed to a definite base of operations and line of attack. In my own view all of these means of defence must be used, and should be thoroughly organized, but above and before all our fleet must be maintained and raised to the full strength and degree of efficiency for successful offence which is always the surest means of defence. But however strong our Navy may be, so extensive is our Empire that, as has frequently been demonstrated, an invasion of England is not a mere chimera evolved out of the inner consciousness of weak-minded panic-mongers, but it is a very real and present danger to us if we are unprepared to resist it, and I need not go over this ground again. It will be enough to say that we are *not* prepared, and that at the present moment, in the absence of our fleet, England is unquestionably quite open to invasion.

The primary need is the absolute superiority of our fleet, and that we should always be prepared to resist a landing by a suitable system of defence, including both the attack of the enemy on the water by local naval means which would also be the only possible way of preserving our sea-coast towns from bombardment, and also by movable land forces to oppose his landing. No Englishman can contemplate without indignation and dismay the idea of a foreign army established even for a short time in our country, and we should take all possible precautions to prevent such a thing from being ever accomplished. By an active coast defence we can undoubtedly make it exceedingly difficult, and this difficulty may be so great as probably to deter an enemy from attempting it; but all experience goes to show that a skilfully arranged attack in sufficient force may prove too strong for the comparatively weak defence which, from the nature of things, can only be secured at each point on our extensive coast line; and unless we have a home army sufficiently strong and well equipped and disciplined to crush the invader after he has landed, we may be conquered.

The order of precedence therefore is first a strong navy; second, a defence of our coast line, and more particularly of small harbours, which might serve as bases of operation for an invader; third, an army to meet the enemy in the field should he succeed in making good his landing. And here I would incidentally observe that in my judgment any large expenditure on permanent fortifications encircling London would be a waste of public money. What we do want, as has been forcibly and clearly explained by General Sir E. Hamley, in a lecture delivered in this theatre lately, is a sufficient body of well-trained and well-armed volunteers whose special object and duty is the defence of the metropolis; and that their annual training should include definite instructions as to the position each corps would occupy, and the works of demolition and construction they would have to execute in case of invasion. This is but a small extension and specializing of the organization of our volunteer army, an army of which the nation may well be proud, although much still

remains to be done to give it full value, and notably that each man should be able to shoot straight if even at short ranges only. But to shut up millions of people in this great city seems to me out of the question—to feed them in peace-time is little short of a miracle—but with an active enemy outside our gates, cutting the railways and roads by which supplies come in, a few days would end the matter, however strong our fortifications might be.

All that can be hoped for is that the General Officer commanding the army in the field should have no fear that an enemy landing, perhaps, in two or three separate places, could, with one part of his force, make a dash on London and seize it while the remainder engaged our army. I am quite aware that imperfectly trained troops defending extemporized entrenchments would be hardly pressed by thoroughly trained regular troops; yet I have sufficient confidence in my countrymen to believe that they would be able to hold their own for a sufficient time to save London, by giving time for the field army to arrive on the scene. But it is on our coast line that we want the greatest numbers, and as our old system of martello towers and similar works is now obsolete, a new organization for coast defence is a pressing need. It is a very large subject, and I will not attempt to deal with it now; it should be taken up and reported on by a joint Committee of naval and military Officers, with whom should be associated Officers of the volunteer army.

As regards our first requirement—a strong Navy—much has been said and written of late. I do not propose to discuss the question of its sufficiency for our necessities. That our personnel is the first in the world is an axiom, and although our guns are doubtless somewhat behind the times, we are now alive to our deficiencies and are making gallant efforts to pull up leeway. With a well assured naval superiority to any probable combination of the Great Powers we may be satisfied, but with less than this it is impossible for such a Power as England to be content.

It has been argued that this is our *only* need, and that as long as we maintain our naval supremacy, invasion is out of the question. We may admit this so far as to acknowledge that were our Navy destroyed there would be no need for invasion, for England could be quickly starved into submission—dependent as we are for our food supply on our imports—and for our national wealth on our commerce—naval supremacy is beyond all doubt a necessity for our national existence.

But even with a powerful Navy still in existence, were we engaged in a real struggle with a combination of Great Powers, who will say but that on the sudden outbreak of war, before we had made war preparations, or while our naval strength was fully occupied at a distance from England, a powerful army might not cross the Channel to attack us in our island home were we unprepared to resist it? I think it must be acknowledged that past history leads to the conclusion that such a contingency is by no means impossible, and that we live in a fool's paradise if we don't prepare for it. Certainly, even if an actual invasion in force were not attempted we should be

exposed to the great danger of the destruction of our naval arsenals and still more of our great commercial ports, those great sources of national wealth and strength, if they be left unprotected by sufficient defences in the absence of the fleet.

It is to this question of most pressing national importance that I would draw your attention, and in its consideration I would also include the protection of our coaling stations and of our military ports abroad, which are practically of as great importance to us as a nation as are our ports at home. England is no longer merely an island or a kingdom of two islands, but a great Empire stretching over the world; its various parts linked together by ties of commerce and kinship and mutual interest, and depending for its unity and strength on our command of the sea. This command of the sea requiring, as it always did, secure harbours for refuge, revictualling and refitting, needs now the further provision of ample supplies of coal at convenient depôts within steaming distance of one another. One of these depôts wrested from us and in an enemy's hands would cripple us greatly and cut off our connection in a great degree from some of the integral parts of the Empire. Hence it is that this question of coast defence as applied to harbours has assumed the very highest importance to the British Empire.

There are several ways in which a defended harbour may be attacked. If taken by surprise on the sudden outbreak of war, a small squadron might enter one of our great military ports and might inflict most serious injury before forces could be collected to meet such an attack; or possibly an enemy might declare his hostility after he had entered the port as an apparent friend and so turn all our defences; or in a more regular way, an enemy may content himself with bombarding a harbour from a distance, to destroy shipping taking refuge, and the stores and means for refitting or building ships in it; or he may enter the harbour with his ships after having first silenced and destroyed the defences. Or if only opposed by batteries defending a channel leading to the port he may risk running past them at speed if not prevented by mines or obstructions; or, finally, he may land men in the vicinity and so turn the sea defences and open the way for his ships.

These different modes of attack or any combination of them must therefore be guarded against; and in designing the defences of any particular port we must take into consideration the probable strength of the attack to which it may be subjected. In these islands, owing to our proximity to the Continent of Europe, the attacks to which we are liable are of the most serious nature, and our defences must be of a character suited to meet such attacks. The more important also the place to be defended the more likely is it that an enemy would be prepared to make considerable sacrifices to destroy or gain possession of it.

Our great military ports, like Portsmouth and Plymouth, must therefore be strengthened to the utmost, so as to be able to beat off a most formidable attack, as the loss of one of them would be a national disaster.

On the other hand, a great commercial port like Liverpool, however serious would be the national and private loss involved by its bombardment or destruction by an enemy, would not touch the life of our fleet and the national power in the same way as the capture of Portsmouth, and therefore it does not offer quite so great a prize to an enemy, who would be the less inclined to make great sacrifices in attacking it. The defences may therefore be of somewhat less strength.

In distant parts of our Empire, as in Singapore, for instance, where an enemy would be at a great distance from his naval base, and could therefore not refit or obtain fresh supplies of ammunition and coal with facility, his attacks would probably be of a less serious nature than those he would make on ports nearer his own base of operations.

The natural features of the ground, and configuration of the shore, and the existence of shoals or rocks, or strong tides with great rise and fall, or other peculiarities affecting navigation, all influence the system of defence to be adopted, and each particular case must be studied with reference to all such points before a wise decision can be arrived at as to the best disposition of the several elements which should be combined in due proportion to obtain a defence suited to the special circumstances of the place. But whatever be the means adopted, in these days of sudden outbreaks of war and of the general readiness of foreign Powers for rapid mobilization, it is vitally important that each defended port should be ready at very short notice to resist attack, having a complete organization and well defined chain of responsibility.

The principal element of defence against a naval attack must always be artillery—a war-ship is a floating battery, its power is mainly in its guns, the shells from which can produce great destructive effects at long ranges.

Bombardments are now possible at ranges of 8,000 to 10,000 yards distance, which would have seemed fabulous in former days, and although the actual destruction produced by a bombardment may be less than would be at first sight thought probable, yet, if ammunition be plentiful, it is undoubtedly very serious, and may be disastrous, if magazines be exploded or important storehouses set on fire.

Dockyards are perhaps less inflammable now than they were in former days, as iron enters so largely into the construction of our ships, yet a great quantity of wood and other materials that can be set on fire must be found in every dockyard, and in any case the bursting of large shells containing many pounds of powder or perhaps dynamite will work great havoc.

This artillery attack must in most cases be met mainly by artillery defence, and the selection of the proper number of guns of suitable calibre and power is generally the first consideration. The number of guns now employed in coast defences is very much reduced as compared with the number formerly considered necessary. Several causes have combined to bring about this change.

First, guns have increased so greatly in size, power, and cost that ships carry but few of them—120 guns was the armament of an old three-decker. The most powerful first class ironclads now carry from

4 to 10 or 12 heavy guns. The total weight of metal may not be far different, as the old smooth-bored guns, the heaviest of which weighed 95 cwt., have now been replaced by rifled guns of from 39 to 100 tons weight; but the rate of fire with these monster guns is, of course, much slower than with the smaller guns formerly used.

A modern ironclad is fairly invulnerable in all her vital parts to the projectiles of light artillery, and it is therefore necessary that the shore batteries should have at least a few guns capable of penetrating the armour of such ships as are likely to be brought to attack them. This is the first essential, and it must be borne in mind that the risk to the ship is always much greater than the risk to the batteries on shore. If a battery is struck its parapet may be injured, a few men may be killed or wounded, a gun may even be disabled by a lucky shot; but if the magazines are sufficiently protected no great disaster can occur, unless the attack so far overmasters the defence in number and weight of guns and accuracy of fire that the gunners are driven away, and the batteries are silenced, as happened at Alexandria; but if the contest be at all equal, each penetrating hit on a ship means not only terrible destruction in the confined space on board, but also perhaps injury to the engines or steering gear so as to render the ship unmanageable, or possibly so great a rent in her side between wind and water as to sink her outright, or so to disturb her equilibrium as to put her out of action. And beside all this, the gunners on shore have now at their command such accurate instruments for ascertaining ranges and directing their fire, that the percentage of hits from the guns on shore, with stable platforms and everything in their favour, ought always to be much greater than the percentage of hits from the guns on board ship, which in most cases are on unstable platforms, and have less accurate means of getting their ranges.

It is true that naval gunnery has made great strides, and that under favourable conditions ships may make very good practice, and further, that the gunner on shore, if he fails to lay his gun correctly on a ship moving rapidly, may have to lose much valuable time in training and laying again, while the ship can steer her course so as to bring her guns to bear when she pleases; but the system of position-finding is altering all this, and when it is fairly established will enable the guns on shore to make practice incalculably better than could have been made under the old system by the most skilful gunners. It follows, that upon the whole the old condition of things may still be considered to hold good, and that a few guns on shore well placed, well protected, and well served, will still be able to contend on even terms with a much larger number afloat.

But it will not do to content ourselves with a few armour-piercing guns only. Ships carry, in addition to their heavy guns, an armament of medium, quick-firing, and machine-guns, and if they can approach within 1,000 yards of shore batteries containing only a few heavy slow-firing guns, they may pour upon them such a storm of smaller projectiles as to make it impossible to serve the heavy guns, and this danger is greatest when the batteries are at a low level, and the guns

close together. This mode of attack must be met by a somewhat similar armament on shore in all cases where ships are not kept at a distance from the batteries by shoal water or other obstacles. In any case a number of lighter guns will be associated with the heavy guns to keep up the fire and to attack the unarmoured or thinly armoured parts of ships.

We arrive then at the general conclusion that the character of our artillery defence should be ordinarily a limited number of armour-piercing guns supplemented by a more numerous array of medium, quick-firing, and machine-guns.

But there is another class of artillery fire which is doubtless destined to take a very prominent place in coast defence in future, and which probably may also be used on board ship with good effect in calm water. Ever since the days of Coehorn high-angle fire to attack an enemy from above instead of in front or in flank has been used more or less; but with the old S.B. mortar such fire was so very wild and uncertain that it had fallen somewhat into disrepute. Rifled howitzers have now, however, restored to high-angle fire its full comparative value, and foreign nations have for some time past accepted the heavy howitzer as an important weapon for coast defence. It is evident that a heavy shell falling on the deck of an ironclad turns the flank of its armoured defences, and if it has power to penetrate the lower steel deck it may destroy the engines, blow up the magazines, and even sink the ship by knocking a hole through the bottom. It is, however, a well-known fact in ballistics that high-angle fire and high velocity are well-nigh incompatible, and as penetration varies as the square of the velocity, the penetrating power of howitzer shells fired at high angles and with comparatively low velocity is small.

On the other hand, the flotation power of ships has its limits, and if the sides be made safe against direct fire by thick armour, the decks cannot be protected by heavy armour also. The practical limit for deck defence seems to be 3 or 4 inches of steel, and this is probably penetrable by 9-in. or 10-in. shells. Experiments to determine this point are now being made, and we shall then be able to determine the necessary calibre of the howitzers to be employed for this purpose. If then we can succeed in hitting ironclads at long range by heavy shells falling on their decks at a high angle, we shall have enormously increased the relative power of shore batteries. For whether the steel deck at the water-line be penetrated by the heavy shells or not, the shells will certainly penetrate the upper decks, and will burst in the ship amongst the men and guns, and the effect of such explosions will be so very destructive that we may fairly calculate on making ships move off when they find themselves subjected to this form of attack.

Recent experiments have shown that the chances of hitting a fixed target by this means when the range is accurately determined are very good, and it follows that no ships could anchor under the long-range high-angle fire of heavy howitzers.

The chances of hitting a *moving* object by fire of this character are

no doubt very much less. The time of flight of the howitzer shell for a long range is so great that it is very difficult to judge correctly the direction in which to fire. The rate of motion of the ship, the time of flight, the action of wind, and many other disturbing influences all combine to render high-angle fire at moving objects uncertain. On the other hand, long-range fire from ships is most inaccurate unless they are at anchor, or unless they circle, firing when they reach a buoy or other fixed mark at a known range from their target. If they anchor they can be hit, and the fixed point at which they deliver their fire, if in motion, is also a target for the howitzers on shore, which will materially aid their practice.

As against bombardment then, howitzers will doubtless play a prominent part, and happily for us it has been found that our old muzzle-loading rifled 9-inch guns, and probably those of higher calibres, can be readily and cheaply adapted for this kind of fire; combined with them must be a few long-range B.L. guns to make our fire thoroughly effective; but there can be little doubt that few naval commanders would risk the destruction or serious damaging of their ships by this howitzer fire to obtain the somewhat problematical results hoped for by the long-range bombardment of a dockyard or harbour; in most cases an attacking fleet would prefer to come to closer quarters, and either run past the batteries, or silence them at moderate ranges.

The experience of the last American War showed that ships could generally run past shore batteries at speed without suffering much damage, and if the prize to be gained be sufficient such tactics would doubtless be tried again were no means taken to prevent it. The obstacle which most thoroughly meets this need is the submarine mine. There is something so horrible in the idea of being suddenly blown up without the slightest power to resist or retaliate, that mines whether under ground or under water have always, since their first introduction, had a most deterrent effect on attacks. The knowledge that certain waters are mined is certain to keep away from them any but the most determined or foolhardy Captains, and it may be safely assumed that no modern fleet would risk the terrible danger of running through a channel defended by submarine mines, until those mines had been in some way rendered harmless. The addition of submarine mines to our coast defence system has thus enabled us to dispense with many guns which would otherwise have been necessary, and to obtain a more efficient defence at a less cost. The lessons of the late combined operations at Milford Haven have been variously read, some warm naval advocates having assumed that the defence by submarine mines had proved ineffective, and that the naval attack had an easy victory—others having taken a very opposite view. Having been officially connected with the operations, I may be allowed to express some opinion upon the real state of the case. And first I must say that the primary condition under which the operations were undertaken was that it was *not* to be a trial of strength and skill as between Navy and Army—but rather a field-day from the careful observation and criticism of the events of which lessons might be deduced to

assist us in improving our defence system. It was assumed that the naval attack would be strong, that it would be directed with skill and energy, and that the constant practice of the fleet would show to great advantage in the perfection with which they would carry out their programme.

And these assumptions were fully justified by the action of the fleet. The attack was most ably designed and directed, and was executed with admirable precision and skill, but unreality in both attack and defence is inevitable in all such peace manœuvres. Some of the elements of unreality which favoured the defence were the following:—

1. The defended channel, both from motives of economy and also for convenience of traffic, was only a portion of the whole channel. This limited the range of choice for the assailants, and brought them closer to existing forts than might have been otherwise the case.

2. The mines were *fresh laid*, and therefore were more likely to be in good condition than if they had been laid some months and had got stale.

3. The preliminary bombardment was omitted from the programme. Had it taken place, it *might* have resulted in much greater injury to the defence than to the attack, owing to the works and armaments at Milford Haven being old and imperfect as compared with the power of the attacking fleet—but it *might* no doubt have been otherwise.

On the other hand, the circumstances which favoured the attack were numerous—

1. It was agreed that, for fear of accidents, the ironclads were not to be attacked by torpedo-boats of the defence at the critical period of their entrance into the Haven, and which would have been the defenders' opportunity.

2. The "Hecla" carrying the countermining boats and gear of the attack was allowed to anchor and unload under the fire of the works of defence.

3. The obstructions were damaged by private vessels before the action commenced, and so boats could get through and attack the mines without much difficulty.

4. The attacking force were accurately acquainted with the position of the mines, and consequently they knew where to begin and where to end the operation of countermining a cleared channel through them; this of course would not be the case in war.

5. As in all such cases the effect of fire was minimized by the rule that only boats under electric light for a certain time were ruled out of action, and thus a few shots, directed by electric light, or prolonged fire directed by moonlight counted for nothing. Recent experiments have shown that a countermine boat can be rendered useless by a few rifle or machine-gun bullets, and no doubt even unaimed fire would have done much injury to the countermining boats of the attack.

6. Further, as was natural, the attacking boats were disinclined to go out of action when ordered to do so by umpires until they had finished the task of destruction set them, and were soon found in

the thick of the fight again. This indomitable spirit is the life of our Navy, but it produces somewhat anomalous results in peace practice.

7. The channel so skilfully cleared by the naval countermines was only half the prescribed width, and thus only half the work was really accomplished.

8. Finally, it was of course known that the mines were harmless, and although some ten large and four small mines were fired by contact or by observation during the course of the attack, no notice was taken of them, probably the small blowing charges were not observed. Hence the whole deterrent moral effect was absent, upon which so much depends in actual warfare.

The deduction I make from the Milford Haven experiments is first of all that our military organization for defence of harbours is at present lamentably defective, in fact, we have no such organization at all. Our naval organization for attack, on the other hand, is excellent. Yet with all these advantages it would appear that the destruction of a submarine mine defence is a most serious and dangerous undertaking, for although the umpires' report on the detailed results of the operations has not yet been rendered, it is already well known that the countermining operations had not resulted in the complete clearing of a safe channel of full width through the mine-field, and that the measure of success attained cost the attacking squadron excessively heavy losses. No fleet in the world has brought the system of countermining to the same degree of perfection as has been attained in the British Navy, and if they found the overcoming of very imperfectly organized defence a difficult operation under peace conditions, *a fortiori* under war conditions a less perfectly organized naval attack would have to make tremendous sacrifices before they broke through a combined defence of mines, guns, and torpedo-boats properly organized and drilled as I hope ours may be in future. For if we have learnt something of the difficulties to be encountered by an enemy in such an attack, and notably the absolute need of a calm quiet place in which to make his preparations for countermining, we have also learnt where our weakness lies, and that is *mainly* in the want of a suitable organization and training for the proper combination with artillery fire of the new means of defence which have quite recently come into existence.

The problem to be solved in the defence of a harbour is a problem in tactics of a totally novel and extremely intricate character, and if we consider how many volumes have been written on the subject of the tactics of the three arms, and how much thought and careful training are required to work together infantry, cavalry, and artillery in a battle on land, there is little room for surprise that in our early efforts to combine in harmonious action heavy artillery, medium artillery, quick-firing and machine-guns, and infantry fire, submarine mines, electric lights, systems of signalling, guard-boats, and torpedo-boats, we should have made mistakes and have failed to obtain the full value out of all these varied and special weapons and means of defence. But I trust that the lessons we have learnt from those most

instructive operations at Milford Haven will not be thrown away; that they may soon bear fruit, and that a great advance in the knowledge and practice of these new amphibious tactics will be evident on the next occasion when similar combined operations may be undertaken. Former experiments at Portsmouth had made it evident that to succeed in the very dangerous undertaking of opening a passage through a submarine mine-field, darkness is essential to cover the operations of the countermining vessels. We are therefore in the preliminary stage of our new tactics launched at once into the difficult operations of night attacks and night defences. Every soldier knows the special difficulties which attend such operations, and when our business is to prevent an enemy from injuring or destroying delicate machines, and to use these machines at the right moment to injure or destroy him, it is evident that perfect training and prompt and skilful action are eminently necessary in harbour defence. The defence of our harbours is indeed a business which now calls for the exercise of the very highest gifts, and is a field of employment for the most scientific and able Officers.

No doubt when a body of Officers and men have been as well instructed in these new means of defence as our army is in field operations the task will be easier, but in all its branches it is eminently scientific; and whether we direct our attention to the heavy guns worked by machinery and having their fire directed by the beautiful system of position finding, of which Major Watkin, R.A., is the apostle and Captain Lewis, R.E., the prophet, or to the system of submarine mine defence so patiently and thoroughly worked out and elaborated during past years by a series of Engineer Officers of whom Colonel Armstrong, the present head of this branch of defence, is perhaps the most eminent—or to the electric lights to guide both fire and mine defence at night—to the signalling system by which co-operation must be insured, or to the flotilla to meet the naval attack on its own element, we see everywhere the necessity for the very highest development of scientific skill, and for the exercise of those attributes of pluck, promptitude, nerve, and coolness which have won for the British nation its high position amongst the other nations of the world. It will be evident that to ensure co-operation to the best advantage amongst all these elements of the defence a competent head is absolutely essential. An Officer who has at least a general knowledge of the duties of the various branches of the composite force under his command, and who is therefore able to exercise and drill them separately and together, so as to ensure harmonious working to the best advantage; such a head is a primary necessity for every port or main channel to be defended by a combined force of artillery, submarine mines, and defence vessels.

It might be supposed that these combined defences would be best undertaken by the Navy, whose training and ordinary duties have fitted them for dealing with such matters far better than those of most military Officers. And we might be strengthened in this view by the fact that most of the great Continental Powers have made the defence of their ports a naval rather than a military organization.

It is beyond a doubt that if this new duty were imposed upon our Navy, they would in course of time work out a most efficient organization on naval lines; but it would have to be a completely new organization. I believe I am fully justified in stating that not a man nor an Officer can be spared from the existing personnel of our Navy to undertake shore duties. The rôle of our Navy is attack, not defence, or rather defence by freedom to move wherever they might be wanted to meet an enemy or protect a friend. Our naval power must be felt at the utmost limits of our Empire, and we cannot afford to chain our fleet or our sailors to our shores. The *raison d'être* of the defences of our military ports is to give a free hand to our Navy, and to enable them to take the sea with the confident assurance that their bases of operations will be safeguarded in their absence. Without a Navy thus free to act in all directions, our Empire ceases to be a power, and our commerce is at the mercy of our enemies. With the great Continental nations the case is different. Their armies are to them what our Navy is to us—a necessity of their existence as free and powerful States; therefore, soldiers cannot be spared for the defence of their harbours, and that duty is given to their navies, which are to them of secondary importance. Besides, we have already the elements of a military system which, with some vitally essential improvements, will meet our necessities in the defence of our ports, and to break up this organization instead of improving it, and to throw an extra strain upon our naval resources, instead of husbanding their strength for their primary duties, would be a serious mistake.

When once we have placed the defence of each port under an Officer responsible to the General of the district for the complete efficiency of the defences of the port, as far as the means in men and material placed at his disposal will permit, we shall have made a great step in advance. A general system of tactics for such defences must then be elaborated and practised constantly at each port, and the Volunteer element must be widely encouraged to take a full share in these local defences. Local knowledge is so absolutely necessary for an efficient harbour defence, that the personnel must be localized as far as it may be possible to do so.

There are besides several other points in which our defence system is still wanting. Guard-boats are an acknowledged necessity to protect submarine mines against attack at night; but the best sort of vessel for the purpose—how these vessels should be manned, commanded, and armed, and how they may be employed to the best advantage, so as to co-operate with the artillery in keeping enemies at a distance, without obstructing the fire of the guns or being fired into themselves by mistake—are still questions which have not been fully solved. The use of torpedo-boats to combine the element of attack with that of the defence, as always should be done as far as possible, is another question still somewhat unsettled.

But I would reiterate, as impressively as I can, that the primary need is for proper organization and command. We have most of the elements of a good harbour defence more or less developed, but no

organization and no commanders for combining them—no acknowledged system of combined tactics and drill.

A General who can handle infantry, cavalry, and artillery with ease and skill at Aldershot or on the battle-field must inevitably be quite at sea when suddenly placed in command of a semi-naval force to meet a naval attack. The probable nature of this attack, and the means to be used and how best to use them to resist it, are all unknown to him. Not even a Napoleon or a Wellington could handle such a force effectively without previous training and practice, and some knowledge of the different arms under his command. The money spent on guns, mines, and all that belongs to harbour defence is well nigh thrown away unless we have also a well-arranged system of using them in combination with one another, to accomplish their common object.

An army in which the three arms acted independently or were under the command of a General ignorant of tactics might indeed win the day against another army equally without organization by sheer valour, but if opposed to an army thoroughly organized and well commanded, the result would probably be very different. The case is quite similar with coast and harbour defence. Without proper organization and command, guard-boats may rush to the front and be annihilated before the action commences in earnest, and so the mines may be destroyed with comparative facility. Electric lights will not be used to advantage either for the artillery or the submarine mines. Gunners will fire into their own torpedo- and guard-boats; these will get in the way of the gunners and miners, and prevent them from destroying the enemy for fear of hurting their friends. Endless mistakes will be made to the advantage of the enemy and the irreparable loss of the nation, all for want of proper practice under well-qualified Officers held responsible for the harmonious working of the whole defensive arrangements.

Before passing to the consideration of some of the details of the artillery defence, I must allude to two new weapons for marine warfare which will probably take an important place in coast defences. The Whitehead torpedo has long since been adopted by the navies of all nations as an essential part of their equipment, and some even predict that torpedo-boats will drive ironclads off the seas. Be that as it may, and however much recent experiments have tended to show that their effect may not be so instantaneously destructive as had been anticipated, locomotive torpedoes are weapons of undoubted value, and all foreign Powers are adopting them largely. A new form of this weapon having a much longer range than the Whitehead, and being steered at will in any required direction, has lately been brought to such perfection that it cannot be ignored, and the Brennan torpedo will probably find its appropriate use in the defence of many channels in which the conditions are not favourable for the use of submarine mines, or in supplementing the artillery and mine defence of positions of great importance.

This torpedo has a speed of 16 to 18 knots, or as much even as 22 knots at short ranges, and it can strike with a fair degree of

certainly a vessel passing at full speed within 1,500 yards to a mile from its starting point. It carries a charge of 200 lbs. of gun-cotton, and would therefore presumably destroy the largest ironclad. It may be fairly assumed that no man-of-war would willingly venture within reach of such an unpleasant and unseen enemy, and that these locomotive torpedoes will be largely used in the future. Should the Brennan torpedo prove as useful as those who have carefully observed its action believe, and should it be introduced into the Service, the credit will be due quite as much to Sir Andrew Clarke, the late Inspector-General of Fortifications, who, against considerable opposition, has caused it to be worked out and perfected, as to the talented inventor himself.

The Nordenfelt submarine boat is another new and most promising invention, which has already been so far developed that several foreign Governments possess some of them, and the late incident in Greek waters, in which one of these boats ran the blockade *under* the blockading ships and got back again safely in the same way, is most suggestive. The main element of power in this engine is secrecy. It can travel like an ordinary torpedo-boat at 16 knots on the surface, and at will it can be submerged and can move at reduced speed in any direction and invisibly, and can so approach a ship without possibility of detection and discharge a torpedo at her. Doubtless the crew must possess both skill and daring. Their occupation is dangerous; but the moral effect of such means of defence would be extremely great even if their actual effect were less than might be expected.

I must now say a few words on the selection of sites for guns and the mode of mounting them for coast and harbour defence. We have already discussed the reasons which have led to a great reduction in the number of guns used for the purpose; but the question of how to mount and protect the guns so that they may be able to produce the greatest effect of which they are capable throughout the widest possible arc and up to the full range at which they are effective, while at the same time they are exposed to the least risk of being silenced by the enemy's fire is a question to which a complete answer has not yet been obtained. This is mainly an artillery question, yet it is one in which the artillery and the engineers are so closely connected and on which the whole system of coast defence so depends that I cannot pass it over.

In the selection of sites we are frequently governed absolutely by the natural features of the ground. If the shores of the water to be protected are but little elevated above the water-level, we are evidently obliged to use low sites for our guns. Such sites, if the water be deep enough for war ships to approach within 1,000 yards, are very unsuitable for open barbette batteries, because at ranges not exceeding about 1,000 yards the auxiliary armament of the ship would pour such a hail of small projectiles on to the battery that no gunners could serve the guns. Were the shore battery on a site 300 feet above the water, this fire with a more ascending trajectory would have much less effect, and guns in open emplacements might contend on

fairly even terms with the ships. In such low sites we are therefore driven to some expedient for protecting the gunners against this close attack, and we have the choice of disappearing mountings with overhead shields, such as have been tried lately with success for 6-in. and 8-in. guns, and which trials will shortly be extended to 9·2-in. and 10-in. guns; or of casemated batteries; or for very heavy guns which must be worked by machinery, we may use turrets or protected barbette on the system used on board H.M.S. "Collingwood." Should the water, however, be shoal to such a distance from the shore as to preclude the attack by heavy ships at close quarters, open barbette batteries may possibly be used even on such low sites. This form of mounting has many advantages. It is the cheapest; the guns can fire over a wider arc; they can be used with extreme elevation for long-range or high-angle fire; the batteries can be made inconspicuous, and the guns can generally be widely spaced, so that the effect of a bursting shell may not extend to more than one emplacement. These advantages, and more particularly that of economy, have led to the large use of open barbette batteries whenever they can be applied with fair chance of adequate protection to the gun detachments, both on low and on high sites; but on the other hand this adequate protection of the gun detachments is a problem not yet solved, and the gun itself is very much exposed. For breech-loading guns sloping shields attached to the carriage are proposed, which will protect the men and the breech mechanism from the smaller projectiles, but they increase the size of the target and would be worse than useless if struck by a heavy projectile; against a side fire they are of course useless.

Where sites elevated from 600 to 300 feet above the sea level are available, they present many advantages. From such high positions a ship is looked down upon, more or less, and as her breadth is always greater than her height out of the water, the target presented to the gunner is a larger one than is seen from a low site, and this target is also more vulnerable, as even in the case of ships with armoured decks, such as are now generally being built, the thinner deck armour is more liable to penetration even when struck at a low angle than the side armour. The moral effect produced by the fire from a commanding position is no doubt greater, especially when the ranges are comparatively short and the fire becomes plunging; while the effect of the fire from the ship is considerably less, and particularly so at the shorter and more destructive ranges.

On the other hand there are some disadvantages inherent in high sites. If the water be deep inshore some of it will be unseen from the battery on a high site, and a ship may run past without coming under the close fire of the battery. If the parapet be cut down to allow of firing with extreme depression the protection to the gunners and gun is proportionately reduced.

In many cases, as before observed, we are limited in our choice of sites by the features of the ground; but sometimes the choice is presented to us of a low site near the channel to be defended or of a high site, say 1,000 yards inland. As regards the safety

of gun detachments, the high site would doubtless be preferable, but as regards penetrative power of our projectiles, the balance would be in favour of the advanced low site. The question then has to be decided, perhaps, by a balance of economy. A more powerful gun *en barbette* on the high site may be cheaper than a less powerful gun in a turret, or casemate, or disappearing carriage, or some other description of protected mounting on the low level, and yet at the greater range may have equal or greater effect, and its chances of being disabled by the enemy's fire may not be far different. The cost of the site and of approaches to it, and of conveying the gun and its appurtenances to it will also have to be considered, and further, the question whether from the high inland site practice in peace-time may not be difficult or impossible owing to the damage that would result to houses between it and the sea.

It will be readily understood then that whatever be our opinion as to the relative advantages of high or low sites, or of different modes of mounting and protecting our guns, we must be prepared to adapt ourselves to the great variety of conditions which present themselves in practice, and that no theoretical rules can be of universal application. The higher velocities and longer ranges of the projectiles of modern B.L. guns as compared with those of the older type of R.M.L. guns have given no doubt a greater latitude of choice of sites than we had in former times, still the limits are soon reached, and when we consider the increased strength of modern armoured ships, and that penetration into iron decreases with increase of range—at moderate ranges about 1 inch for every 600 yards—it will be clear that we cannot retire our guns far inland without robbing them of much of their power of offence.

Foreign nations possess a large number of war-ships carrying armour to protect their vital parts over 16 inches thick, and this armour in many cases is steel or compound armour, the resisting power of which is considerably greater than in wrought iron, although the exact increase is perhaps difficult to determine as it depends mainly on the nature of the projectiles used.

The French alone have some seventeen ships of this class—eight of them having armour from 20 to $21\frac{1}{2}$ inches thick—and it will be evident from the following table, giving approximate penetrations at different ranges into iron when hit directly, that with the less powerful guns increased range quickly deprives them of penetrative power; and it must be remembered that we have as yet none of the most powerful modern B.L. guns mounted in our coast defences.

	Guns.			Penetration into wrought iron at ranges in yards.					
	Calibre.	Weight.	Powder charge.	1,000.	2,000.	3,000.	4,000.	5,000.	
	ins.	tons.	lbs.	ins.	ins.	ins.	ins.	ins.	
M.L..	17.72	100	450	24.4	22.7	21.0	19.3	17.6	Only 4 mounted Only 2 mounted
" "	16.0	80	450	24.4	22.7	21.0	19.3	17.6	
" "	12.5	38	210	18.0	16.2	14.5	12.8	11.0	
" "	10.0	18	70	11.7	10.0	8.4	6.7	5.0	
B.L..	..	110	820	32.0	30.3	28.6	27.0	25.3	
" "	..	65	500	25.7	24.0	22.2	20.7	19.0	
" "	12.0	45	295	20.5	18.7	17.0	15.3	13.6	
" "	10.0	32	250	19.2	17.5	15.8	14.0	12.4	
" "	9.2	..	160	16.0	14.3	12.6	11.0	9.2	
" "	6.0	..	50	10.4	8.7	7.0	5.3	3.6	

From this it will be seen that irrespective of the chances of hitting, which of course are much greater at the shorter ranges, particularly in hazy weather, the most powerful of our M.L. guns, of which we have only six mounted in our coast defences, could not master the armour of the most powerful armour-clads now afloat at ranges over 1,500 or 2,000 yards; while the 38-ton guns, of which we have a considerable number, are quite unable to penetrate the armour of these ships at any range, and at ranges over 1,500 or 2,000 yards they would not destroy the less perfectly protected ships of this class.

The B.L. guns of 45 and 32 tons weight might possibly injure the most powerful armour-clads at ranges within 1,000 yards, and the less strongly protected first class armoured ships up to 3,000 or even 3,500 yards.

The B.L. guns of from 65 to 110 tons have power considerably in excess of the resistance of the best protected armour-clad ships now afloat even up to 5,000 yards range. But of these we have none at present on shore.

Within the limits of their power, however, it may be safely said that the balance of opinion at the present time is in favour of retiring the guns from the coast-line and in placing them widely (about 200 feet apart), as against massing them in batteries of guns close together on the shore; the positions of these dispersed guns being concealed as far as may be by assimilating them to their surroundings, selecting, if possible, positions which have backgrounds against which the guns and works will not show up distinctly from the sea. Judicious planting will often effect this object and so make the task of the naval gunner vastly more difficult than if he had a large distinct target like one of the great two-storied casemated forts of the last period to deal with. On these principles most of our new defences have been designed under the direction of Sir Andrew Clarke, who has consis-

tently advocated the principle of dispersion and concealment of guns, as against concentration and protection by iron or masonry.

It is curious and instructive to look into the history of the changes of manner which have occurred from time to time in emplacements for guns, whether for coast or for land defences. The introduction of what was then considered powerful artillery obliged engineers to adopt earthen parapets instead of masonry; but high-angle and ricochet fire led to the adoption of casemates instead of open batteries, the masonry being made strong enough to resist the artillery of the day. As artillery grew in power and accuracy, iron shields were introduced into the casemates to shield the guns and crews, and diminish the size of the widely gaping embrasures needed in thick walls; the later advances in artillery have now rendered masonry altogether inadmissible, and we are driven to cover our guns either by iron or by earth, using concrete in some cases to a limited extent. Earth is the favourite wherever it can be used on account of its cheapness, but who will predict what the outcome of the present state of change may be?

The accuracy and power of high-angle fire from rifled howitzers is now so great that traverses are but of little use, and if solid overhead cover be not provided, scattering and concealing the guns by every expedient that can be devised is the natural counter to this mode of attack. The degree of accuracy that may be attainable by howitzer fire from on board ship is still unknown; but recent experiments made by H.M.S. "Hercules" at a target on the sands at Shoeburyness seem to point to the conclusion that this mode of attack will not be confined to land sieges; but that whenever the position of a group of guns without strong overhead cover can be made out from the sea that group will be subjected to high-angle as well as to direct fire. Even a single heavy gun may possibly be attacked in this manner if mounted *en barbette* or with only a thin shield covering the disappearing emplacement. It must always be remembered also that the scattering of guns increases very considerably the number of men required to guard them from attack by landing parties, and the labour of looking after them and protecting them from injury in peace and in many other ways is inconvenient. We must face these difficulties whenever we decide on adopting the principle of scattering guns which from the point of view of making it difficult for a naval attack to silence the guns by artillery fire has otherwise much to recommend it. In this, as in all human affairs, perfection is not to be attained, and we are obliged to accept certain disadvantages whatever disposition or mode of mounting we adopt.

The hydro-pneumatic disappearing system of mounting has now been under trial with guns up to 6-in. calibre for some considerable time, and with these lighter guns the early difficulties have been so far overcome that the system is now practically adopted for all situations where the guns are likely to be exposed to attack on a very wide arc, and so have to be placed in pits for all-round fire, or, when they are necessarily on low sites; in some cases also where, owing to cramped sites, it is necessary for other guns to be placed on higher ground in rear and to fire over them; in that case the horizontal shield over

the emplacement protects the gunners from the danger of prematurely bursting shells fired by friends in rear, as well as from the enemy's shrapnel and splinters of shells which would otherwise search out the pit.

A pit, properly so called, which is not open in rear but is enclosed on all sides, is a most dangerous position for a gun unless so roofed over, as missiles of all sorts passing over the parapet are caught by the back wall and deflected round the inside of the pit with most destructive effect. The overhead shield averts this danger it is believed in a great degree, although experiment has not yet tested the point. Whenever it is possible a gun emplacement should be quite open in rear, so that projectiles passing over or grazing the crest of the parapet may fly clear away to the rear without being caught and exploded or deflected back. A glacis slope upwards in rear of an emplacement may not be injurious in this way, as projectiles ricochet onwards upon it; but it has the disadvantage of enabling the enemy to correct his elevation by showing him that he is firing too high; of this he has no indication when there is no solid background close behind the gun.

The hydro-pneumatic disappearing system has been successfully adopted for the 8-in. gun by the enterprising colonists of Victoria—and we are about to try it for the 9·2-inch and 10-inch B.L. guns with every hope that it may answer also for these heavier natures. If the trials prove satisfactory we shall then have the choice of mounting guns up to 32 tons weight either in barbettes, or on the H.P. disappearing system, or the heavier guns may be mounted in casemates or in turrets in those cases where the cheaper mountings are not considered suitable.

As regards casemates we are, as before observed, obliged now to alter their construction and to use iron instead of stone. I am in hopes that designs elaborated by Major English, who has for many years devoted his attention specially to the subject of iron defence, may prove suitable for converting some of our existing masonry shielded casemates into works capable of resisting modern artillery, at moderate cost. In their present state they are unable to resist attack by heavy B.L. guns.

The principle of the method proposed is to reduce the number of guns, to remove the upper tier, as a rule, from two-storied forts, to thicken the shields of the emplacements retained by using the shields of the other casemates, and either to replace the piers altogether by iron (of the Gruson hardened cast iron type), or to case the piers outside with a sufficient thickness of this material, and to strengthen them internally, and bind the structure together by an inner casing of wrought iron. The roof of iron girders and concrete would be made strong enough to resist all attack, and the magazines would be protected by concrete plated with cast iron. The cost of such remodelling would be about 4,500*l.* to 5,000*l.* per casemate. Details have not yet been worked out, and some preliminary experiments may be necessary; but the proposal appears likely to be of great value in many instances.

Casemates wholly of iron, as at Spithead, now need the additional plating which was foreseen as a probable future contingency when they were first constructed, and for which provision was made in their design.

The casemate system has the advantages of complete protection against fire of all sorts except that entering the embrasure. This opening must, however, be given considerable dimensions to allow of training and elevating and aiming the gun, and the rope mantlelets, which were formerly proof against small arms and splinters, are now easily penetrated by the powerful machine and quick-firing guns lately introduced. The casemate has therefore lost in some measure its former security, even if made of sufficient strength to resist modern heavy projectiles. Its old disadvantages of limiting the training of guns to an arc of about 60° , and of also making extreme elevation for long-range fire very difficult without unduly increasing the height of the port, remain.

Nevertheless, in some low cramped sites where ranges are limited, and an important channel is to be defended by a powerful fire, the casemate must possibly still be used, and the necessary number of guns to command thoroughly the important water must so be protected. Breech-loading guns are much better adapted for casemates than muzzle-loading guns, as the gun itself gives a great degree of safety to the gunners when loading, as compared with the muzzle-loader.

The very heavy guns, over 45 tons weight, require machinery to work them; for guns over 18 tons, indeed, machinery would be advantageous by reducing manual labour and so increasing rapidity of fire and saving men—but for the heavier guns it is essential. The mode of mounting must therefore be suited to steam, or hydraulic, or other motive power, and this power may be taken into account in the works designed for them. Turrets, or protected barbettes such as are used on board H.M.S. "Collingwood," are at the present moment the most satisfactory methods which have been adopted for mounting such guns, although at Malta and Gibraltar we have adopted a species of barbette mounting with hydraulic machinery for working the guns and loading them under cover. Guns mounted on turntables, and protected by turrets or steel decks, have a great arc of fire, but they are liable to get jammed by heavy blows.

With modern long guns the turret has lost some of its advantages, as the long chase of the gun, its weakest part, remains exposed. This is still more markedly the case with the "Collingwood" mounting, in which the gun fires *en barbette*, and the breech only is lowered through an opening in a steel deck for loading. Many new designs are now under consideration for mounting these very heavy guns, of which it would be premature for me to speak. We have no such guns ready for mounting on shore at present, and the number of them likely to be required is not large, as the great cost of these weapons makes formidable inroads on any sum voted for defences.

I have alluded to Herr Gruson's hardened cast iron as a material for casemates and turrets. This material has been largely adopted

by the Italians and other Continental Powers, and recent experiments at Spezzia have shown that a turret of this nature is practically indestructible by even the most powerful modern guns. In his designs for these structures, Herr Grison takes special pains to close the port through which the gun fires by means of the gun itself. In some cupolas for small guns for land defence the gun is absolutely pivoted in the port in the cupola wall, and no recoil is allowed to the gun in the cupola; but the whole cupola is arranged to recoil very slightly, being kept in position by very powerful springs. For small guns such a plan is possible, but for heavy guns the force of recoil is probably too great to allow of its being dealt with in this way, and it would seem that recoil is a necessity. The principle of muzzle-pivoting can, however, still be used in a less complete way.

Complete muzzle-pivoting obliges us to raise or lower the whole weight of the gun when depressing or elevating, and this is a serious business with very heavy guns; nevertheless, the port is so tempting a mark for the small, accurately shooting guns that we are more or less driven to this expedient. In our earlier casemates, the port was made large enough to allow of as much elevation and depression as was deemed necessary. In later casemates, the gun-carriages were arranged to raise or lower the trunnions of the gun for shorter or longer ranges, and thus but little height of port was needed for elevation and depression, and this was a decided gain, and with rope mantlets the casemates were fairly safe against projectiles of all sorts. The new quick-firing and machine-guns have now, however, mastered the mantlets, and we are driven to still further reducing the size of our ports. In a turret this is of little consequence, as the gun is laid by laying the turret; but in a casemate a very small port diminishes the field of view so far that the laying of the gun is greatly interfered with, and indeed can only be properly accomplished by means of position finding.

The mode of mounting machine and quick-firing guns in coast defences is a subject still somewhat unsettled. In iron casemated structures quick-firing guns have been successfully pivoted on the sills of ports where the men using them have fair protection; but as yet we have no suitable mounting for earthworks, as the essential principle of these weapons is that recoil is stopped altogether, or limited to about half an inch; the strain on the mounting is very severe, so that strong mountings are necessary. For machine-guns, with their relatively greater weight and small charges, the problem is much easier, and we shall have no difficulty in this case in obtaining convenient portable mountings. In both it seems probable that the element of portability must be largely used, and that the lighter classes of these weapons must be kept under cover during a bombardment, and placed rapidly in position when needed to repel a close attack. The heavier natures must be protected by iron, or must be mounted on some modification of the disappearing carriage, by means of which they can be raised into the firing position, or lowered under cover at will, and in all cases the positions of these weapons must be concealed as far as may be.

I have now alluded briefly to the general principles on which our coast defences are being prepared at the present date. To illustrate the subject I would refer to a special case and show an ideal defence of a harbour. I will take the well-known harbour of Plymouth as the example and deal with it as if it were a *tabula rasa* without any defences. There are always many solutions of such a problem. I will give one which commends itself to me and which will serve to illustrate the various modes of defence which I have endeavoured to describe, as applied to a very strong defence of a very important harbour.

First, it is necessary to guard against distant bombardment, which would now be possible within the zone shown in blue. This protection may be given in great measure by heavy howitzers in the outer line, but they must be supplemented by a few long-range guns, and also by torpedo-boats, either surface or submarine.

Next we must guard the entrance channels east and west of the breakwater, of which that on the west is the more important, and prepare to meet a close attack. For the attainment of these ends I would propose the following defensive arrangements.

In rear of the breakwater two 68-ton guns in a turret or other suitable mounting can act both against bombardment and near attack; on the heights right and left some heavy guns mounted *en barbette* plunge their fire down on a ship attempting to enter. The two channels are commanded at close range by casemated batteries at a low level on their shores. On Drake's Island and the Staddon heights some few guns command the inner waters, and would combine with the turret and the guns on the heights to crush any vessel attempting to force her way in, or which might have succeeded in passing the breakwater.

Submarine mines defend both the channels, and both outer and inner groups of mines add to the strength of the defence. The mines are partly electro-contact, arranged to explode as a ship touches them, and so moored that they rise and fall with the tide on Major Ruck's system, and thus are always invisible but always effective; some are either ground mines laid on the bottom, or buoyant mines moored at a considerable depth, and to be fired by observation at the moment when a ship is passing over them. The cables containing the electric wires are led to a secure test and firing room, where from time to time their electrical condition is observed, and where a tell-tale board shows when a mine is touched by a ship. When an enemy is at a distance the mines are rendered inactive by disconnecting the firing battery. At night powerful electric lights placed low down and as far as possible from the smoke of the guns, and having alternative emplacements so as to enable them to be placed to windward of the smoke, are in readiness to illuminate the mine-field and reveal any attempt of the enemy to tamper with the mines. The lights are thrown on reflectors which can quickly be renewed if struck by shot, the lamps and lenses being protected by strong parapets; and automatic, mechanical arrangements enable the operator to direct the lights from a distance where he is removed from their dazzling glare.

The guard-boats armed with the quick-firing and machine-guns are in readiness to frustrate any attack on the mine-field by the enemy's small craft, and their position and movements are so regulated by preconcerted arrangement that they will not obstruct or suffer from the fire from the shore—swift torpedo-boats or other steamers scout out in front and give notice of impending danger.

Brennan torpedoes would give additional security to the main channel of entrance, being manœuvred from Picklecombe and from near Cawsand. A third might form a reserve defence near Drake's Island, and a fourth might be worked from the breakwater fort.

The total of the defensive arrangements suggested for this ideal defence are as follows:—

- 4 68-ton guns—two of them in a turret.
- 18 10-inch guns.
- 18 6-inch guns.
- 20 heavy howitzers.
- 28 quick-firing guns.
- 4 Brennan torpedoes.
- 3 Nordenfelt submarine boats, submarine mines, electric lights, and flotilla for laying and guarding the mines.

The total cost would be approximately—

	£
For guns.....	350,000
For works	375,000
For Brennan torpedoes.....	28,000
For submarine boats.....	30,000
For flotilla	20,000
For mines and electric lights ..	30,000
	<hr/>
	£833,000

The guns are all worked by position finding from suitable observing stations on the heights, and ships coming within range would be exposed to concentrated salvos from all the guns bearing on them. The Commanding Officer would have issued his orders as to what ships were to be fired on, at what ranges and with what projectiles; the guns would be loaded, and then laid by means of horizontal graduated arcs and elevated for range, in accordance with information sent electrically from the observing stations and exhibited automatically on dials in the batteries. The firing tubes are then connected for electric firing and the men stand clear, notice being sent electrically to the observing station that they are "ready." The observer having laid his telescope on a certain spot over which he has been able to predict that the ship will pass, if she does not suddenly alter her course, and on which the guns have now been laid, waiting for a few seconds until the ship appears in his telescope at the fatal spot, and instantly touching the firing key: the guns roar out, and send their shell with beautiful precision at the target. This sounds too complicated and scientific to be practicable; but seeing is believing—the system is no longer a project, but an accomplished fact, which I have

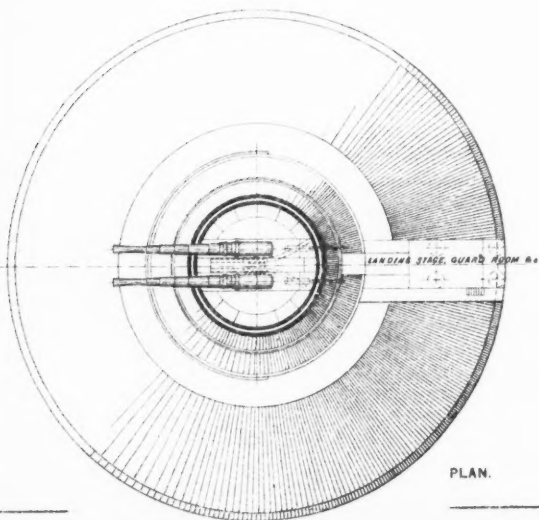
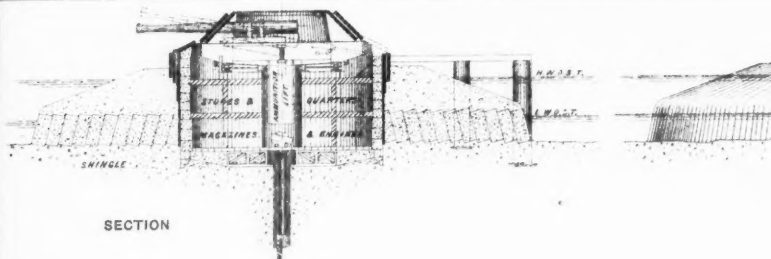
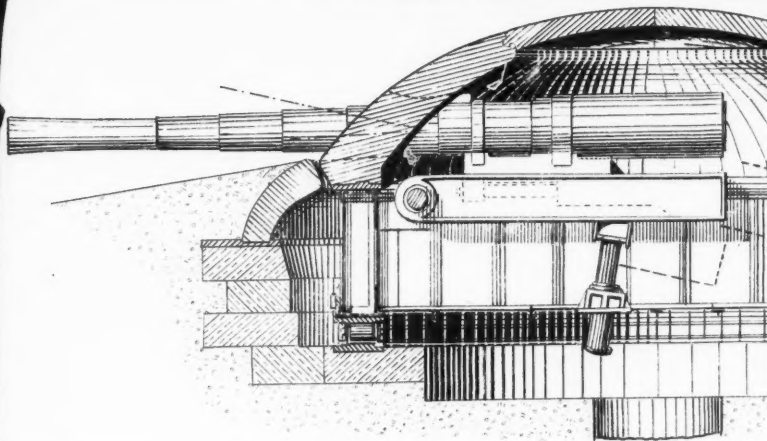
witnessed in successful operation—and which I hope may soon be applied to every important battery we possess. The result of such firing as compared with the old independent firing, at ranges estimated by guessing, and at swiftly moving objects, is as different as light from darkness, and the percentage of hits will be probably increased tenfold. The reduced number of guns now adopted for coast defence purposes is thus fully justified by the increased efficiency resulting from this system of position finding.

Supposing the enemy's fleet to be unable to accomplish their object by bombardment, owing to the risks to which they are exposed by our long-range and high-angle fire. They would probably endeavour to silence our batteries by a closer artillery attack, if they could see no good prospect of success by landing troops to attack the guns on shore, owing to the presence of a sufficient body of troops to guard them. If, in a sufficient degree, they succeed in silencing our guns, they may try to prepare the way for entering the harbour past the batteries by destroying the submarine mines at night—and then our defences will be tried most severely, and good organization and command will be put to the test—in their absence the attack may succeed in doing this, and the defence may be broken through, but with good arrangements and defenders who have been trained and practised in performing their several parts, the efforts of the enemy to remove this barrier to progress should not succeed without the most serious loss to him. We may be justified in assuming that a defence well organized on the above plan would be so strong that no fleet could overcome it quickly or without very heavy losses. To deny the harbour to an enemy's ships for some days during which they continued the attack, would oblige them to lie off outside during this time, and at night they will be exposed to attack from our torpedo-boats, by day also they would be subject to this risk if we have submarine torpedo-boats. Storms may arise and drive them off, or our fleet may arrive on the scene and settle the matter by a naval action. The Milford Haven operations exemplified the last phase of such an attack, the attempt to destroy the mine-field. The enemy would choose a dark calm night. He would send on his torpedo-boats and light craft in advance to cover his attack, supported by ironclads in second line as a base from which the countermining boats would advance to endeavour to lay their mines and so to destroy those of the defence. The enemy's armoured ships would support the attack by their fire, and the smoke would help to obscure his operations; light vessels would endeavour to drive in those of the defence to prepare the way for the countermining boats—and then the electric lights, the artillery, especially the quick-firing and machine-guns, and the guard-boats would have to act in concert on prearranged plans so as to repel the attack and prevent any hostile boats from passing through our mine-field and injuring the electric cables by creeping or sweeping; or the countermining boats from laying their countermines. If the defence is well conducted the enemy should not be able to succeed in either of these operations; but there are chances in war, and they might be in his favour, and a partial success might be obtained. If he can

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No. 1.—GRUSON TURRET FOR 156-TON GUN.

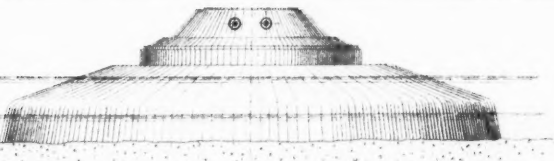
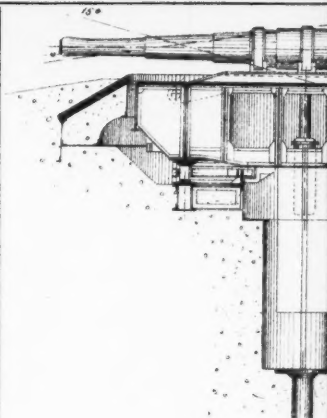
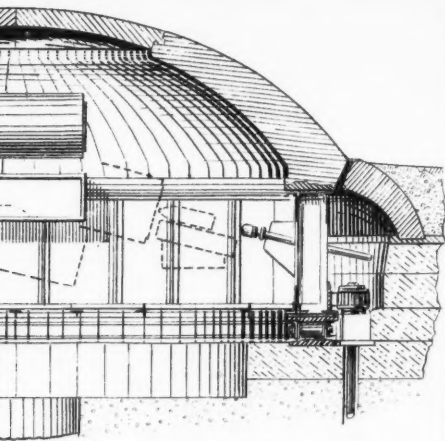


WROUGHT IRON

Outside d
Guns 12'

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156-TON GUN.



ELEVATION

No. 11.

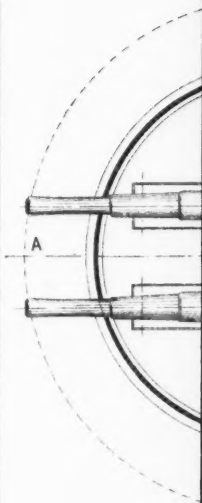
ROUGHED IRON TURRET FOR 2 156-TON GUNS.

Outside dia. of Turret 64 feet.

Guns 12' 6" Centres, Recoil allowed 10 ft.

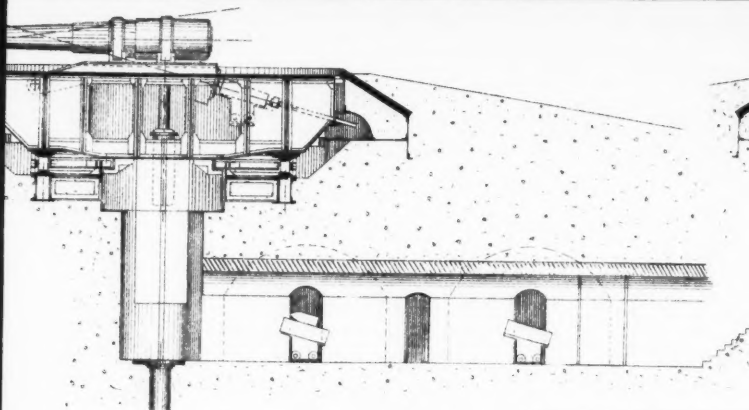
*" Elevation 11° (loading angle), depression 3°
may be loaded at any angle of Training.*

SCALE OF FEET.

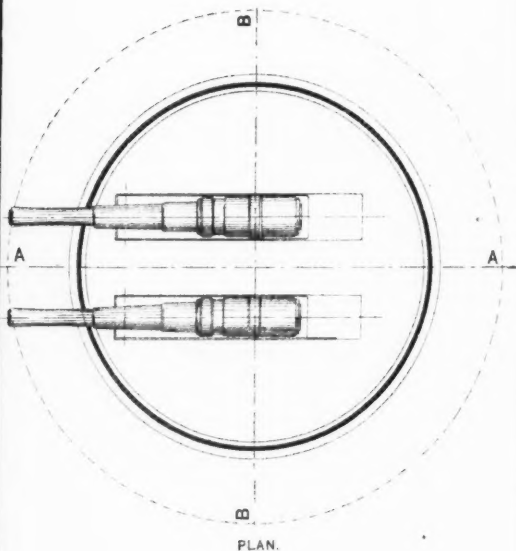


COLLINGWOOD M
AND IMPROVED
2 68-TON GUNS





SECTION ON A. A.



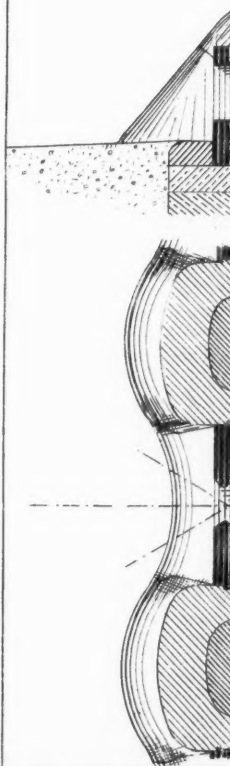
No. III.

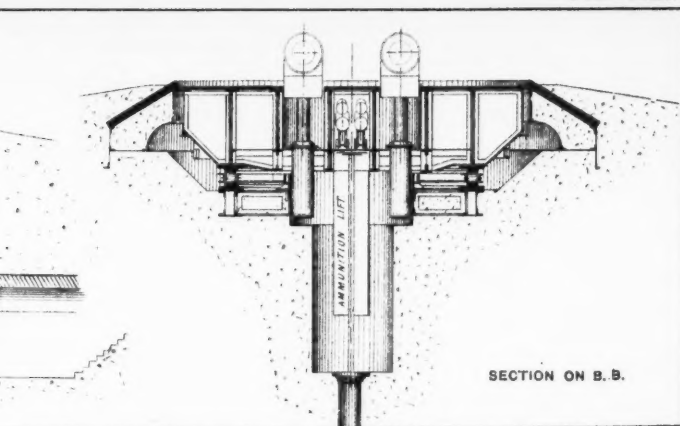
COLLINGWOOD MOUNTING WITH STEEL DECK
AND IMPROVED LOADING ARRANGEMENTS FOR
2 68-TON GUNS.

SCALE OF FEET.

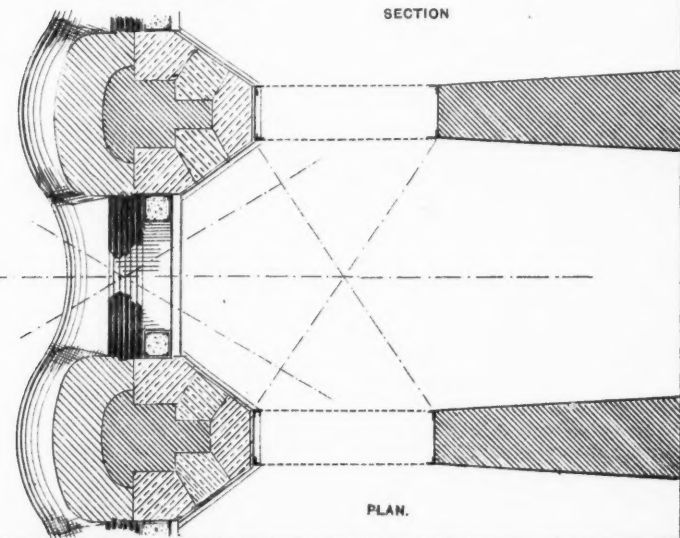
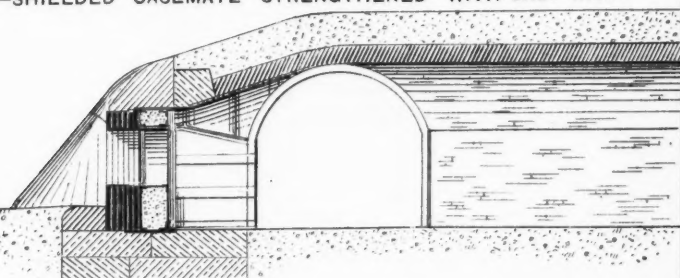


No. IV.—SHIELDED

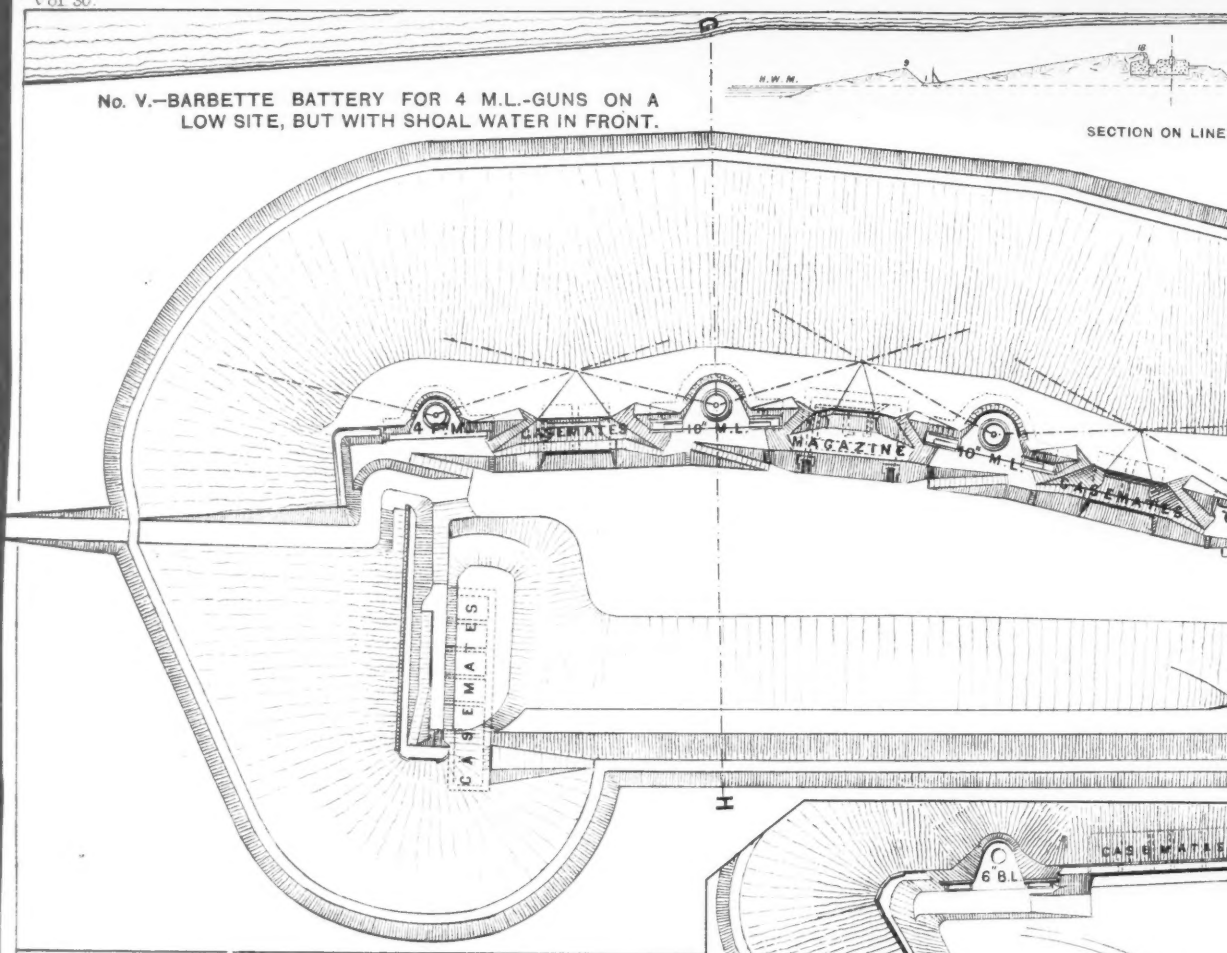




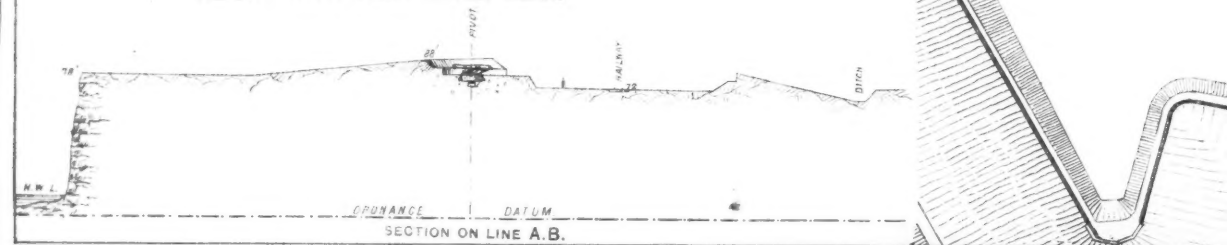
-SHIELDED CASEMATE STRENGTHENED WITH CAST IRON.



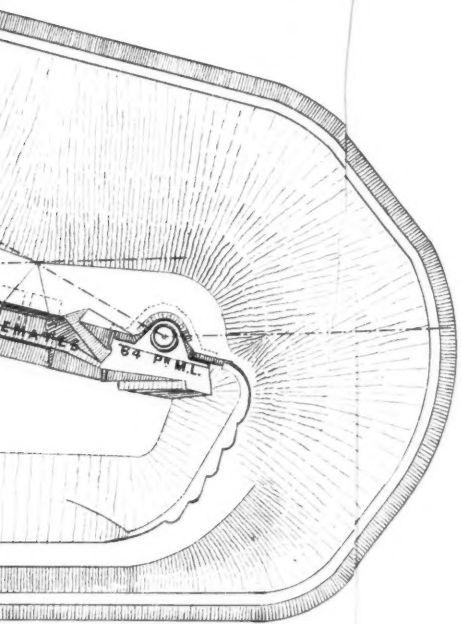
No. V.—BARBETTE BATTERY FOR 4 M.L.-GUNS ON A LOW SITE, BUT WITH SHOAL WATER IN FRONT.



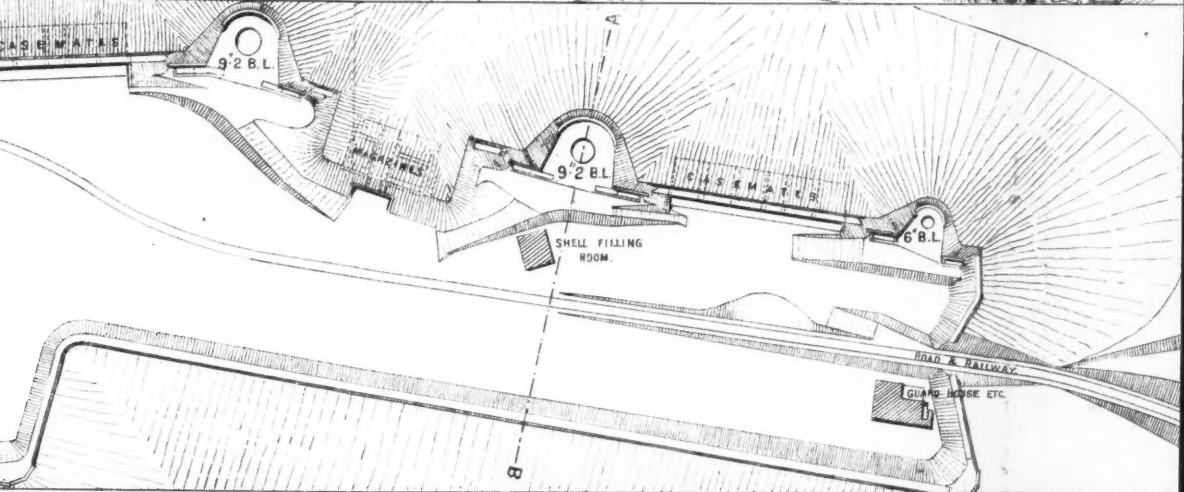
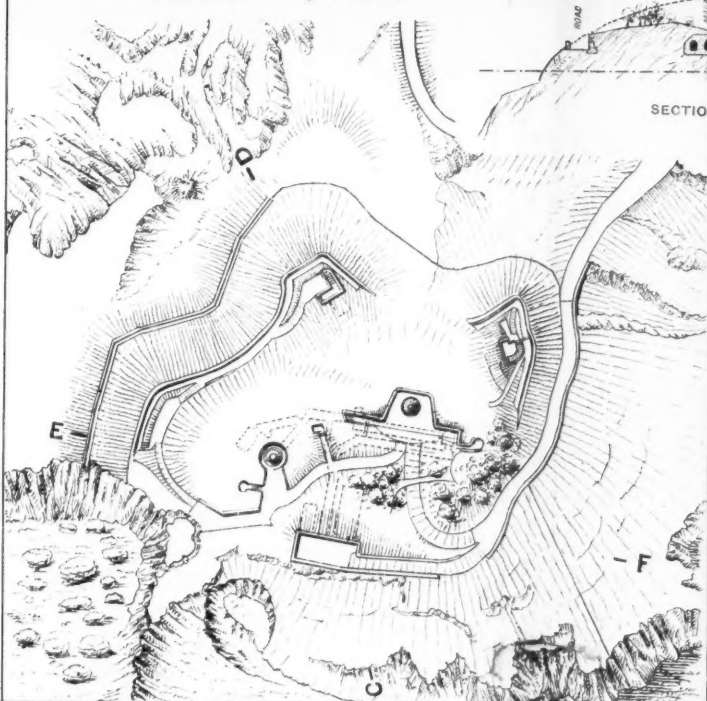
No. VI.—BATTERY FOR 2 9.2-IN. AND 2 6-IN. B.L.-GUNS ON H.P. MOUNTINGS ON A SITE OF MODERATE HEIGHT WITH DEEP WATER NEAR.



SECTION ON LINE G.H.

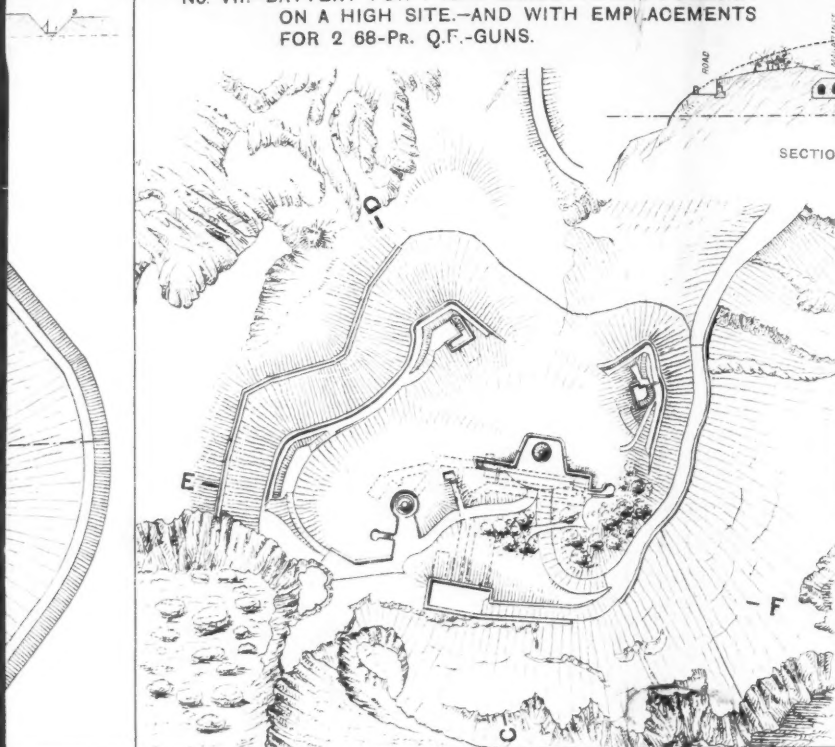


No. VII.—BATTERY FOR 1 10-IN. BARBETTE AND 1 6 IN. H.P.
ON A HIGH SITE.—AND WITH EMPLACEMENTS
FOR 2 68-Pr. Q.F.-GUNS.



Battery No. VII. on St. Margaret's Island, W.C.

No. VII.—BATTERY FOR 1 10-IN. BARBETTE AND 1 6-IN. H.P.
ON A HIGH SITE.—AND WITH EMPLACEMENTS
FOR 2 68-PR. Q.F.-GUNS.

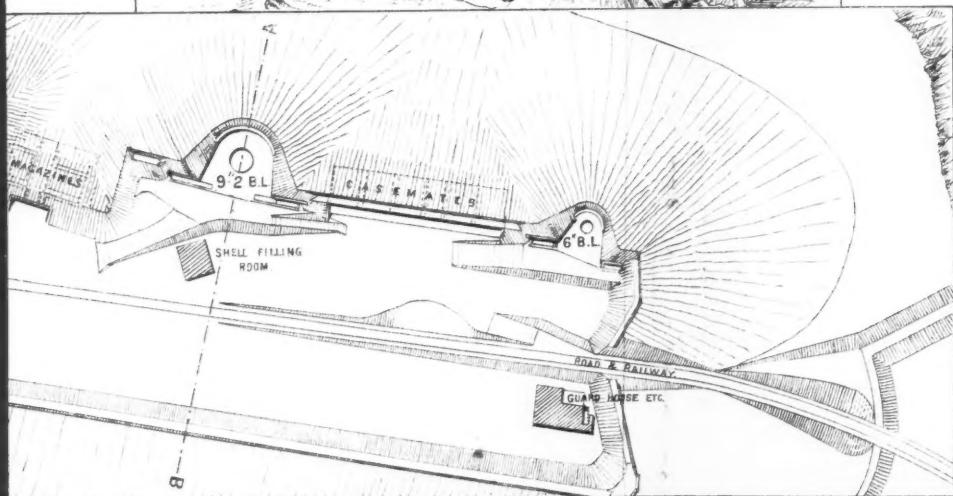


SECTION ON LINE C.D.

No. VIII.—DEFENCE OF

REFERENCE

- 68 TON
- 10" DISAPPEARING
- 10" CASEMATE
- 10" BARBETTE
- 6 INCH
- RIFLED HOWITZER
- 40-PR. Q.F.
- BRENNAN TORPEDO
- ELECTRIC LIGHT



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at once advance an ironclad into the countermined water, and if he has so far overcome the fire of the shore batteries that he can maintain the vessel there during the following day and work on again from it with countermining the next night, and so on, until he has cleared a passage right through our mines, without our being able to replace them, he will have nearly attained his object, for if he has been able to overcome the outer and more powerful lines of defence, he will probably overcome the weaker line within, and be soon master of the situation. The inner line, however, will not have suffered much in the preliminary artillery attack, and it should be able to offer some considerable resistance in combination with the inner mine-field, the Brennan torpedoes, and any flotilla still in existence. Englishmen know well the advantage of a stubborn resistance to the last; the time so gained has often turned the tide of success, and until the last defence has been overcome, the enemy will not be able to hold the port. We have no example of such an attack. I conceive that it is a most improbable contingency, as no Power has a sufficient number of powerful ironclads to risk the loss of so many of them as would probably be disabled or sunk in a contest of so desperate a nature.

It must be understood, however, that the defence of Plymouth which I have described is an ideal defence. Of the existing defences it is not of course right that I should speak particularly. The great advances which have been made within the last twenty years in naval means of attack necessitate a corresponding progress in means of defence.

We cannot escape from the obligation. We can only console ourselves by the consideration that all other civilized nations are under the same necessity.

It is no doubt unpleasant for a householder to find that his roof has begun to leak. He may say that it is not so many years since the house was built, and he had to pay a heavy bill for building it—but the rain comes in and there is no denying it: he may put basins to catch the water, but he can't keep out the rain. Time and storms have done their work, and the roof must be repaired. Or a line of railway is made, and proper rolling stock is provided, and things go on very well for some years, but a rival line is made, and it has improved engines and carriages and permanent way and management, and the trains travel so much quicker, and the stations and carriages are so much more commodious, that everyone goes by the new line, and the directors of the original line learn by sad experience that they must keep up to the times or go to the wall, and much as they may grudge the expenditure it must be faced.

So it is with our national defences—we may regret that artillery and destructive weapons have made so much progress since we created our defences at so much cost, and that they now need expensive improvements, but the fact remains, and unless the nation faces the fact and provides the necessary funds, we are left in the humiliating position of existing as a free and independent nation only so long as our neighbours do not attack us.

The moral of my lecture is briefly as follows: Our national life depends on our commerce, and our commerce on our command of the sea by our Navy—Navy and commercial shipping depend on secure harbours at home and abroad.

Coaling stations abroad are to a certain extent being defended; commercial ports at home are either not defended at all, or defended only by mines, which though a valuable step in advance are sadly incomplete without guns and flotillas. Our military ports, defended at considerable cost some twenty years ago, need revision of their defences to bring them up to date—above all we need organization for the proper and effective use of the means of defence we possess. As regards resisting invasion in force, or the bombardment or seizure and putting to ransom of our sea-coast towns, we must trust in a great measure to our Navy, and to our volunteers, military and naval; and a well-defined system of general coast defence, by which the existing forces may be used to advantage, and expanded where necessary, is much needed, and should be considered and reported on by a suitable Commission and then acted on.

All this means expenditure, and expenditure counted by millions—but it also means national existence in case of a great war, and who can say when this may be upon us? When it comes my hope for England is that we may be found ready, if we are not it will be far too late to hope for any useful result from any efforts or sacrifices we may then attempt to make, and national disaster will be the inevitable result of national supineness and parsimony in time of peace.

The CHAIRMAN (General Nicholson): Having heard this very interesting lecture by Colonel Schaw, we shall now be extremely glad to hear any remarks that any Officers may have to make upon it. I need hardly say that it is an engineering question; but we as engineers hope that representative artillerymen and naval Officers will take a very considerable part in the discussion. I should like to say one word before we begin. To a certain extent this lecture by Colonel Schaw is what I may call an ideal one. It is an argument rather than an indication of a policy. He has touched upon one or two subjects which are at present in the clouds. I think it well that I, as Inspector-General of Fortifications, should make these few remarks before the discussion begins.

Lieutenant-General Sir EDWARD HAMLEY, K.C.B., M.P.: Mr. Chairman and gentlemen, knowing my old friend Colonel Schaw so well as I do, I came here expecting to hear a very important discourse, and I have not been disappointed. Everyone present must be conscious that he has been listening to facts which are new and striking, and which he may carry home with him and ponder over. There is one of Colonel Schaw's opinions which we must all of us most heartily concur in, and that is that the sooner we set about putting ourselves in a proper condition of defence the better. But that is not a new idea. It has been familiar to me ever since I can remember. It is still only in the way of accomplishment, and I fear that the difficulties in that way of accomplishment are not only not diminishing, but are constantly increasing. In the first place we have among us a body of politicians who trade on opposition to expenditure of all kinds—especially for the purposes of war—and they enjoy, unfortunately, a great deal of credit and influence, because they address a very willing audience, and because it is very easy to persuade people that it is not necessary to pay taxes. Then another difficulty is in the ever-increasing costliness of war material. A first-rate ironclad is now so costly that only a first-rate Power can venture to buy one. Guns cost each a small fortune,

and besides this there are all those scientific appliances of which Colonel Schaw has told us, and which mount up to such a sum that the defence of one port, Plymouth, as he estimates, would cost more than 800,000*l.*, and that estimate when it is stretched, as estimates are stretched in the course of execution, would probably amount to 1,000,000*l.*, and that is for one point on our coast only. Well, that affords a very strong argument for the enemies of expenditure and of defence. Another is the transient and progressive nature of war inventions, so that the invention of one year may almost be said to become obsolete in the next. Colonel Schaw has told us that a city may now be bombarded from a distance of 10,000 yards, and he truly says a short time ago that would have appeared to be fabulous. This question of range is going on progressing until one might almost, without seeming to be rash, predict that some day or other we may see the coast batteries of France and England cannonading each other across the British Channel. All this affords a great opportunity for the economist. Of course it is a very strong and a very impressive argument to be able to say, "It is of no use adopting this or that invention, because in a very short time it will be superseded, and therefore you had better wait for perfection." I do not say that is a sound argument—far from it. The sound argument is that we should make the best use in our power of the means that lie to our hand, and keep ourselves constantly prepared; but, nevertheless, it is a plausible argument, a striking one, and one well calculated to impress the popular mind. All these things make the outlook for defence somewhat unpromising, and perhaps the best hope of a better state of things lies in being able to persuade that ultimate paymaster, the British elector, to understand the case more clearly, and to come to a better frame of mind about it. To that end I know of no better means than such a lecture as that which we have just listened to, which puts the most striking facts clearly and forcibly before us. Well, we must take care not to suppose that because a great deal remains to be done nothing has been or is being done. A good deal is being done, and perhaps in a somewhat quiet way. For instance, it is very satisfactory to know that our northern ports and rivers on which we must rely in case of war for our supplies of food are being placed in security, and that at no very extravagant cost. It is also very satisfactory to know that that inestimable force—our Volunteers, is supplying engineers to take charge of these defences in their own localities. Now, one of the most striking facts which Colonel Schaw has brought out is this. It might have been supposed that when a Government had provided sufficient war material for the defence of some of our great ports, as Plymouth or Portsmouth, and had provided works and guns, and all these scientific implements, nothing remained to be done but to leave it to the Officer who happened to be in charge to conduct the defence in case of need. But now we see that the accumulation of war material, though a very important step, is only a step; that it is still necessary to have a head to animate and inspire and conduct all these scientific appliances to their proper end, and that he must be a man of great scientific acquirements in order to deal with these highly scientific implements, as well as a man of skill and intelligence. I therefore do hope that the Government is already taking into consideration how to train Officers who shall be competent to conduct such a defence as Colonel Schaw has pictured for us; and I hope also that the Government will lay to heart every word of Colonel Schaw's lecture. It is no mere complimentary phrase to say that we are greatly indebted to Colonel Schaw, for I know very few who have possessed the opportunities, and who now possess the knowledge and ability, to enable them to set this matter before us as he has done. I think you will agree with me that it is very unfortunate that an Officer who does possess this knowledge and this ability should be lost to the Service by the operation of an arbitrary rule, and it would be a very fortunate thing if some means were devised by which such abilities as his might still be made useful to the State. Of this I feel quite sure, that Colonel Schaw will carry with him into his retirement the good wishes of all the present audience.

Major-General Sir WILLIAM CROSSMAN, K.C.M.G., M.P.: In making one or two remarks upon the very able lecture which has just been delivered by Colonel Schaw, I do not intend to enter at all into any details which he has proposed with reference to the defence either at land or at sea. But I think he has made one most important remark, namely, that organization is the thing that we want. I have

served in the Army, I have served in garrisons, but I cannot say, nor do I think that anyone can tell us, who in the event of an enemy's fleet appearing before Portsmouth or Plymouth would be in command? We have in those places a Commander-in-Chief, but with all due deference to the Officers of the Navy I think without the affix "Naval," that title is a misnomer. We have also a Lieutenant-Governor as we have at Portsmouth, but it is not settled to this day who it is that would command in the time of actual warfare. I think that is a question which ought to be settled, for without a head no defence is possible. There is another matter with regard to the defence of ports with which I have been connected for some time, that is, the submarine defence. My own opinion always has been that that defence ought to be in the hands of the Navy. Although an old engineer myself I think that anything conducted upon the water ought to be done by sailors, and I say this notwithstanding the fact—which my friend Admiral Cooper Key strongly put before me many years ago—that in time of war every sailor will be required to man the ships of the Fleet. Still I think that under the naval organization there might be a body of men retained altogether for harbour defence who would conduct the submarine defence of the various ports of the kingdom. There are also the Volunteers, and I am glad to see in the northern part of the country where I come from that the volunteers themselves are now taking up that question of submarine defence to a very great extent, and doing it well. They are carrying this out under the direction of the Engineers, principally of my friend Colonel Armstrong, than whom no man has done more to carry on this nature of defence in this country; but I repeat that I would rather see all these Volunteers for submarine defence under a naval organization than under a military one. It has also been said that the question of artillery and submarine defence is very much mixed up. So it is no doubt, for submarine mines without artillery and without guard-boats are of no use whatever, and therefore one argument for putting the submarine mines under the control of the Navy is that a flotilla of guard-boats and offensive torpedo-boats is absolutely necessary, and these can only be manned by sailors. As regards the artillery, we have at Portsmouth a thousand of the finest men of the Service in the Royal Marine Artillery. These men are trained as well as any gunners can possibly be, and I do not see why they, instead of being kept in barracks, should not be manning the forts of Spithead. It has been stated that perhaps a coast brigade might be formed for taking charge of the whole of this coast defence. I am very loath to multiply the number of various corps, but I think that if one man is not in command, he ought to be, at these various fortresses, whether a sailor, an engineer, an artilleryman, or an Officer of the line. I believe for my part that the whole of the forces could be brought to work together amicably and well. Colonel Schaw has spoken of a Royal Commission to go into this matter. Well, I have had some experience of Royal Commissions, and I know that their Reports are generally relegated into a pigeon-hole. What I say is that it is the duty of the First Lord of the Admiralty and the Secretary of State for War themselves to adopt some principle and to make such arrangements as are necessary, taking the advice of those men who are best qualified to give it.

Admiral the Right Hon. Sir COOPER KEY, G.C.B.: Sir, during the reading of this admirable paper, I have listened to every word with the closest interest. I had not the opportunity of seeing the paper beforehand, or I should have studied it more carefully, but I have followed the able lecturer closely, and with some experience of the subject. It has reference not only to the attack of fortifications, but to the defence of harbours, which is a matter to which I have paid attention for some years. I followed Colonel Schaw with that intention to criticize which I think we naval and military men all have with regard to each other. We like to criticize our own brother Officers and those of the sister Service when their opinions do not exactly agree with ours. But in this case I must confess that I cannot find a single sentence with reference either to the principles or detail that he has advocated for the defence of our ports against attack by an enemy's ships with which I do not agree. I say this advisedly, for every point, both of the detail and of the general subject, has been of interest to me for many years. I will refer only to two questions, on which I feel with him most urgently. The first is, on whom the responsibility for the submarine portion of the defence of our ports should rest. I do not agree in this matter with Sir William

Crossman, who has also kindly suggested that the Royal Marine Artillery, on whom we rely as a valuable auxiliary arm of Her Majesty's Navy, should be taken from us in order to do part of the duty of the artillery or of the Army, by forming the garrison of the fortifications of Portsmouth. Such a measure would deprive us, I will not say of our right arm, but of a very valuable body of men who belong exclusively to the Navy. This suggestion I have opposed whenever I have had the opportunity of doing so, holding, as I do, that every naval Officer and every seaman and marine should be available at all times for service afloat. I cannot state too emphatically that we shall require all our trained Officers and men in the event of war; and if you were to take from the Naval Service the large number of Officers and men that would be required to protect our ports with submarine mines, you would find that it would seriously weaken the Navy, not only in regard to the large number required for such duties, but they must be taken from the most highly instructed portion of both classes. It is of no use leaving Officers and men for the defence of our ports who have not been carefully trained, and it is those carefully trained men whom we want afloat for the service of the fleet, when untrained men will be only an encumbrance. If we are to leave many of our best Officers and men shut up in ports during war, whether they may be on the active or retired lists or seamen pensioners, I say that the Navy would have to be largely increased, with the sole object of relieving the Army of their proper duty. This is a point on which I feel very strongly, and nothing has pleased me more than to know that foreign countries such as Germany and France entrust the defence of their ports to the navy. We may thus be assured that many of their best Officers and men will be shut up in their ports, and must be withdrawn from the strength of the navy in time of war. Another point on which I agree with Colonel Schaw, and which is one of importance, is the idea of separating guns for the defence of our ports, and of placing them at a certain height, say from 100 to 300 feet, where their power against ships is more destructive than when low, and where they are much safer from fire from the ships. I have long been of opinion that by separating or isolating guns instead of blocking them together in forts as we were formerly in the habit of doing, and as we have done somewhat of late years, we have the very best possible defence against attack by ships, such guns being in earthworks mounted *en barbette* at heights from 100 to 300 feet above the sea, and placed where no two guns can be aimed at by the same gun. This principle I have advocated ever since I was engaged in the action of Olligado, in 1845. I was afterwards consulted about the defence of Plymouth Sound, and I suggested that we should sprinkle guns all about the woods of Mount Edgcumbe wherever they could be placed, which I know would be the best defence you could have for Plymouth Sound. Feeling so favourably as I do as to the value of this paper, it is rather ungracious on my part to find fault with the name "Coast Defence." If our fleet happened to be drawn off to the West Indies, as Nelson's was in 1805, or to the Mediterranean or elsewhere, by a feint movement on the part of combined enemies, consisting perhaps of strong military Powers, affording them an opportunity of making a descent on our shores, they would not come to attack Portsmouth or Plymouth. Their object would be to throw a large force of 200,000 or 300,000 men on shore wherever they could find a landing, but they would not come to the strongly fortified ports like Portsmouth and Plymouth. I should not have said a word on this subject if the paper had not been entitled "Coast Defence." *It is of great importance that we should know what preparations would be made in the absence of our Fleet for meeting a force that might be thrown on our shores in such circumstances, and I would suggest that this paper might have been called the "Defence of our Ports."* "Coast Defence" is really a separate subject, and one of signal importance.

Captain P. H. COLOMB, R.N.: I am sure at this late period of the evening you will not expect me to make very many remarks, especially as I think that the three speakers who have preceded me have pretty well covered most of the ground. Everybody who knows Colonel Schaw, and is aware of the position he has filled so admirably, must have come down here—and the large audience that we have had shows the fact—with the expectation of hearing a very interesting and valuable paper, and that we certainly have had. But my gallant friend Sir Cooper Key used the word "ungracious," saying that it was rather "ungracious" perhaps to criticize

a particular point in the paper. Well, I think myself rather that the business of this audience is to audit, that is, to criticize. We are here to do it, and we should not waste time in going into matters which are not strictly in criticism of the paper. I have been struck all the way through with one point, and that is a point which appears in everything which is said or done in the way of defence. Every lecturer, every person who reads a paper, even the talented gentleman who wrote "The Naval War of 1887," and also the still more talented gentleman who wrote "The Battle of Dorking"—they all start with two propositions; one is that we must have an overwhelmingly powerful Navy, and the other is that whenever we start with anything in the way of home defence we are to suppose the Navy does not exist. We are always to get rid of the Fleet somewhere before we begin. What I think about that is, first, that it is not the way to get money out of the country, and secondly, that it is hardly practicable or politic. My own impression is that, if I had to read a paper of this kind, I should take the subject entirely in view of the actual state of the Navy—what the Navy is likely to do, what it might fail in, and how its failure might be remedied. Then under those conditions I should have said, "Now let us come to our coast defence in view of the facts of what the Navy can do and is likely to do." I doubt altogether the wisdom of prescribing a system of coast defence which is to come before the public as the defence against an attack by an ironclad fleet. It is quite true that Colonel Schaw guarded himself by pointing out that such an attack was in his opinion impossible, but I doubt whether the public will guard themselves in the way that he has done. I fear much that, seeing how tender the public are at present on the subject of coast defence, they may look more to the defence of the harbours and ports of the kingdom, and less to the tremendously important matter of the observation of the enemy's ports—that they may look more to what the enemy may do on our own shores, and less to what it is our business to do on the shores of the enemy. I should not mind it much if there were two separate funds that you could draw upon, but we have to recollect that in this country we draw upon one fund; that if we take away from that fund for one purpose we cannot spend from that fund for another purpose, and therefore I think it will be more prudent in us all, both soldiers and sailors, if in discussing this special question of coast defence we always recollect that the strong probability is that there will not be those immediate disappearances of the whole of our heavy ships, but that what we are liable to on the coast of England is a sudden light attack, which may be organized from one of the enemy's ports, by light ships specially prepared slipping through, as we know that they will slip through, our blockading fleet. I think at the beginning we ought to stick steadily to that and go for it—to say that we want our coast defended against these light attacks, and more especially that we want the waters surrounding our ports defended against the simplest and easiest attack which the enemy can make upon us, that is to say, upon the ebb and flow of our commerce from those ports. I can hardly imagine an enemy deliberately putting himself under gunfire, and under a chance of submarine mines, when he can do us infinitely more damage 5 or 6 miles off the port in the destruction of the commerce which is flowing into and out of it, and so I think the object we should have in view is to aim at guaranteeing our coast and ports against light and chance attacks. I agree very much with what the speakers have said as to how this is to be done. I feel quite confident that we must put the coast defence in the first instance under a separate fund, and next under a separate organization. I quite agree with what Sir William Crossman has said, that the marine part of it must be under trained sailors. I quite agree also with Sir Cooper Key, that those sailors must not belong to the Royal Navy; they may have passed through it, but it is the volunteer seamen about the ports, and the pensioners, and the retired Officers, if you like, of the Navy, who should be utilized and employed, put into a distinct corps, and separately voted for, in order that the defence of the whole coast of England may be treated in a definite and proper way, and always in view of the fact that it is going to have the assistance of the Navy in blockading the enemy in their own ports.

Colonel CRAWFORD, R.A.: Having just returned from Hong Kong, where forts on the new system of *scattered* guns are being constructed, I should like to make one remark on the artillery question of armament, and that is to take exception

altogether to mounting our coast batteries with howitzers. From the Inchkeith experiments it appears to have been assumed that because the *shell* fire from the ships against the fort was very destructive, a *shell* fire from the fort against an armour-plated ship would be equally effective. I maintain that while ships might be armed with howitzers to fire at earthen forts, coast batteries should be armed with *armour-piercing guns*. The object of the ship commander would be to destroy the gunners and earthworks by high-angle fire; but the object of the fort commander would be to sink or disable the armour-plated ship by a *direct fire*, as hard hitting as possible. The chance of hitting a ship at all by high-angle fire is most remote. Take a range-finder (Watkin's depression) and direct on to the water-line of a ship, and read the range, then direct on to the top of the bulwark; the difference between this and the water-line range will be some 200 or 300 yards, so that for *direct fire* the effective area of fire would be 200 yards \times length of ship, while for *high-angle* fire it would be necessary to drop the shell on to the deck of the ship, a very remote contingency, especially for ships in motion. Howitzers have been advocated "to prevent ships engaging forts from anchoring." Experienced naval Officers assure me that they would never think of anchoring, but would move at as high a speed as possible; and looking at the matter from the fort point of view, if a ship did anchor, her range could be accurately determined, and a *direct fire* from the forts should soon make it her last anchoring place. As Admiral Sir Cooper Key has already pointed out, the most effective deck fire would be a *direct fire* from elevated batteries. I trust, therefore, that our coast defences will be armed with *guns*, and not howitzers, as the modern ship-of-war is, I consider, invulnerable to howitzer fire. The Admiral on the China station made the remark, "If I were attacking these forts, I should like them to be armed with howitzers."

General Sir ANDREW CLARKE, G.C.M.G. : With reference to what Colonel Crawford has just said as to the howitzers at Hong Kong, I may state, as the Officer who advised sending these howitzers to Hong Kong on the emergency that had suddenly arisen in the political state of Europe, the object of sending those howitzers was, of course, to apply them as they were usually applied, namely, for high-angle or vertical fire; but what was my astonishment to hear afterwards, that instead of being applied in this way, they were really placed in batteries as if they were intended for direct fire upon ships, and not for vertical or high-angle fire; so the object for which they were sent was entirely misconceived, and they were not really used for the purpose for which they were intended. Everybody is well aware that the area of accurate firing with reference to howitzers is of course very limited in comparison with the area offered by direct fire—that there is a larger margin of chance of missing in vertical firing than in direct firing. But still, as Colonel Schaw has pointed out very clearly in his lecture, the modern rifled howitzer has shown very extraordinary results. I do not know whether Colonel Crawford has had any large experimental trials with howitzers to enable him to judge how far he can depend upon their effective firing, and if he could have given us some information as to that point it would have been very valuable as a guide in future. I believe it is the general opinion of naval Officers—and there are many present who will correct me if I am wrong—that nothing checks the approach of an enemy's squadron so well as vertical fire; it will at least tend to keep them from anchoring. I admit, however, that had I had at that time a number of 10-inch rifled guns to spare, I should have preferred sending them instead of the howitzers; and in case of an attack upon Hong Kong I think they would be found very useful. With reference to the lecture itself, of course my whole sympathy goes with the principles laid down so admirably by my old colleague Colonel Schaw. And here I may say, I do not think Colonel Schaw meant by the words "Coast Defence" quite the meaning that Captain Colomb applied to them. I think he was merely speaking of the principles to be applied to the technicality of coast defence, as we engineers look upon it, and not of the larger and more political question that Captain Colomb alluded to. With reference to the principles that he has laid down, it is a great satisfaction to me to find that they have been so admirably put forward by my old colleague. At the same time, whilst recognizing the force of the earlier part of his paper, I must take a very strong exception to the

instances he has given in its application. I must protest against the absolute departure from every principle, so far as protection for heavy guns is involved, which is laid down in the earlier part of the paper, when he comes to a project for the "ideal defence" of Plymouth. With much of that defence, floating and submarine, and increasing the gun power of Plymouth, I entirely agree; but there is the old idea coming back again, that all these guns are going to be put into cupolas, or that we are going to have revisions and new adaptations of iron and granite. One-half of the large charge of near a million of money which has been brought forward in order to secure the defence of Plymouth goes into iron. Now the policy which has guided me during the last four years is to think first of all of the power of offence given in the gun, and then afterwards to make the best and simplest arrangements possible to protect the gun and the men who fight the gun.

The CHAIRMAN: You are not here, Sir Andrew, upon your own defence, but for the purpose of discussing the paper.

Sir ANDREW CLARKE: I agree. I am now defending Colonel Schaw against himself, for I am protesting against his departure in his ideal defence of Plymouth from the principles which are laid down in his paper, in recommending that we should again have recourse to iron; and I am criticizing the actual application of this paper that we should at the present time—the time may come when this country can afford, but it has not come yet—increase the armoured defences of Plymouth, that is to say, perpetuating an "ironclad on shore." To show how impossible it is to obtain finality with reference to this very question of armour, I may state that in 1873, when many of these works were half finished, an Officer, whose genius I respect, lecturing in this theatre on this very question of iron, said, "We may therefore venture to hope that comparatively little, if any, expenditure will be necessary to maintain the present invulnerability of our iron coast defence." And now, Sir, before these coast defences at Plymouth have been armed we are practically asked to reconstruct them again on the same lines. I therefore protest against a violation of the very principle which has been laid down by Colonel Schaw in the earlier portion of his paper, and which has received the confirmation of Sir Cooper Key. Another distinguished Officer who had a good deal, in fact nearly everything, to do with the construction of these forts in 1870, writes in a published paper: "The iron-fronted forts which have been wisely adopted will for centuries stand against any attack." That was written in 1870; yet we are assured that there is not a single iron fort we have got at this present moment which will stand against modern guns; and what I wish to urge is that not one single farthing should be spent on ironclad forts until we have got the guns necessary to arm the existing defences of the Empire.

Lieutenant GLADSTONE, R.N.: I should like to speak from the point of view of a naval torpedo Officer about that portion of the lecture which refers to submarine defence. Colonel Schaw says it is very necessary that a port should be ready at short notice to defend itself. With regard to that I should like to ask first of all how long it took to defend Milford Haven? Secondly, when it was defended, was it completely defended or only partially so? And, thirdly, how much of the whole defence of the kingdom was affected by the defence of Milford Haven? that is, how many men and stores were taken from other parts of the kingdom in order that these peace manœuvres might be carried out? With regard to the question of supplementing the fixed defence of a port by torpedoes, I think it is worth while pointing out that if such weapons were demanded there is no reason why Whitehead torpedoes should not be constructed to go 30 knots for an increased range, and which should carry a charge of 300 lbs. of gun-cotton. Such torpedoes would be naturally used from submerged batteries, and it is not necessary to do more than look at that chart of Plymouth in order to see how admirably they might be used. With regard to coast defence being in the hands of the Army, I here differ from the lecturer altogether. We have already heard an Officer of engineers saying that he proposes to put it in the hands of the Navy, and Sir Cooper Key says the engineers ought to have it. Sir, this seems as if the times are out of joint. I think in the first place it is not soldiers' work, and that pretty well condenses the whole question. I do not see how they can adapt themselves to it. The question of the mobile defence is a very important one, and the opinion is gradually gaining ground

that the mobile defence is the most important part of our defences. There is no doubt that torpedo-boats for coast defence must be in the hands of the Navy, and to have the fixed defence under a General and the mobile defence under an Admiral will lead to nothing but confusion arising from joint command. It only needs a little friction between the Admiral and the General to bring the whole machine to a standstill. The question of what men are used, is a matter of detail. I think the marine artillerymen would be far the best, and it is only necessary to expand the marine artillery in order that they may be able to do this work and they will do it well. The chief point, however, is that the whole of the submarine defences should be under the Admiral, for I do not otherwise see how you are to get an efficient and thorough defence.

Captain W. H. HENDERSON, R.N. : As a naval Officer I entirely agree with the opinions expressed by Captain Colomb and Lieutenant Gladstone. I think it may be safely assumed that a naval attack on one of the fortified ports cannot take place unless the enemy has command of the Channel. It would require an immense amount of preparation, and the putting forth an immense amount of power; for I take it that possession could not be taken without the co-operation of land forces. To succeed would mean the sacrifice of a definite and almost calculable amount of naval strength, which would probably give us the command of the Channel again. I doubt the efficacy of bombardments at long ranges by ships under way (for ships cannot anchor for this purpose if exposed to gun-fire or Whitehead attack) against unseen objects without any knowledge of the damage done: for the short life of breech-loading heavy rifled guns necessitates every shot being carefully husbanded. Continental nations with their large armies would not break their heads against fortified places if the possibility of overrunning the country was open to them. Some remnants of the Fleet would surely have escaped into the ports, and would, in conjunction with those vessels told off for their defence, assist in repelling any naval attack. On the whole, therefore, the sea defence against a sea attack would be naval; unmistakably it should be under one head, and be naval. Sailors would be more in their element opposed to sailors, and up to their ways and means, than soldiers, who would have enough on their hands in looking after the land defences. Besides, if driven off the sea it would be their first interest and duty to defend their own ports and their own ships and stores in those ports from attack. I do not mean that in the first instance this duty should be put on our first line but, as Captain Colomb suggests, on a second line with a distinctly naval organization supplemented by all the naval forces not afloat, and the crews of disabled ships—it must not be forgotten that the corps of R.M.L.I. are trained as gunners as well as the R.M.A. both afloat and ashore. A certain number of ports, naval, commercial, and strategical, must be fortified—it is our duty to keep them sufficiently efficient, not by asking for and wasting large sums of public money in bringing them up every few years to an ideal state, but by yearly devoting sums voted in the current estimates towards slow and sure improvements and additions. Sea defences are distinct from land defences, as is a sea attack from a land attack; modern developments have tended to intensify the difference, and to show that a naval attack can only be met on equal terms by a naval not a military defence.

Colonel SCHAW: I will endeavour very shortly to reply to the remarks that have been made. Sir Edward Hamley was kind enough to make some complimentary remarks, for which I am much obliged to him, but with regard to his very weighty observations on the financial aspect of the question, I should be glad to make it clear that my estimate for the ideal defence of Plymouth was based on the supposition, happily far from the truth, that no defences were in existence there. What is now required to bring existing defences up to date would cost very much less than the sum I named. Sir William Crossman advocates a naval organization for working submarine mines, and several naval Officers have taken the same view. Of course it is a subject which admits of great difference of opinion and much discussion. I have merely put forward the arguments which appear to me to show that it is difficult for the Navy to undertake it. Sir Cooper Key takes the same view as I do, but it must be a subject for decision by superior authority. Sir Cooper Key objected rather to the title of my paper, "Coast Defence," and said as I referred all through

the paper to the defence of harbours, "Coast Defence" was not quite a proper term for it. I admit the criticism, but I did refer to the general defence of our coasts in the beginning of the lecture, and I said I thought it ought to be taken up and reported on by a joint Committee of naval and military Officers, with whom should be associated Officers of the volunteer army. Harbour defence is, however, included in the larger question of coast defence. Captain Colomb rather finds fault with the line I took in thinking it necessary to defend our harbours at all. As I understand him, he thinks the Navy ought to blockade every possible enemy in his own port, and they never ought to be able to come near our ports. Well, I am very thankful to hear that our Navy is so strong that we do not require any defence at all, that we shall be able to shut our enemy's fleet in their own harbours, so that we shall not require any home defence.

Captain COLOMB: What I did say was I did not wish to provide against heavy attacks by fleets, but you are to provide against light attacks.

Colonel SCHAW: But not against the attack of an ironclad fleet. That has not been the general opinion hitherto. It has generally been assumed that it would be possible under certain conditions of a combination of foreign Powers that we might be in such a position that, our own Fleet being absent somewhere else or partly disabled, there might be a heavy attack with ironclads upon one of our ports, and it is looked upon as the duty of the Army that we should give the Navy a strong and certainly secure basis of operations in our military ports. That has been the principle hitherto looked upon as essential for the safety of the country, that military ports should be made secure against any possible attack. If the Navy think that they do not require this secure basis, that of course leads to a different view of the question. As regards the question of howitzer fire, I think Sir Andrew Clarke has answered what Colonel Crawford said, and I need not refer to it.

Colonel CRAWFORD: Will you excuse me? I referred to it as a principle, not with regard to Hong Kong. I referred to the fact of arming coast batteries with howitzers at all, anywhere.

Colonel SCHAW: The subject has been discussed a good deal, and I think the general opinion is that howitzer fire upon ships is very formidable; it prevents them from anchoring certainly. It is not, however, sufficient by itself; it must be combined with direct fire also.

Colonel CRAWFORD: The last thing I think a ship would do would be to anchor or to attempt to anchor.

Colonel SCHAW: I am sorry Sir Andrew Clarke does not agree with my ideal defence of Plymouth. I gave it as illustrating what I believe to be the case still, that we cannot absolutely adhere to any one system of mounting the guns, and we must be prepared to mount guns not only in earthen batteries, but also behind iron where such protection is necessary. I think the case of the cupola or turret which I propose behind the breakwater at Plymouth is one where iron is essential; you cannot get earth here. Picklecombe is also one where an iron casemate would be very advantageous. I quite agree in thinking that wherever you do not want iron protection it is better to have scattered guns, and to mount them behind earth. Lieutenant Gladstone asked me how long it took to lay down the mines at Milford Haven, and how many men were employed. I cannot give the exact number offhand, but I think it took somewhere about three weeks, as well as I remember, and we had two companies of submarine miners employed. That our numbers are not sufficient to lay down all the mines required for the defence of our ports, I quite admit; we require to augment them, and we are doing our best to do it by means of volunteers. He referred to the Whitehead torpedo in submarine batteries. I confess that was an omission from the defensive means described in my lecture. I ought to have referred to them. We have considered them a good deal, but they are not very much in favour with us at present. I think Whiteheads are always more advantageous when used from torpedo-boats than from submarine batteries, but no doubt there are cases where submarine batteries might be used, and the Germans have used them in some cases, I believe. I am reminded by Colonel Armstrong that the defences laid down at Milford were not on the spot, as the regular defences would have been. The regular defences being in store on

the spot would have been laid down much more quickly. These stores were brought from a distance, which naturally took a longer time to lay down than if we had used the stores of the station ready at hand.

The CHAIRMAN : At so late an hour I am sure you will not expect very much from me. The position which I hold as Inspector-General of Fortifications renders it a little difficult for me to criticize either the lecture itself or the discussion which has taken place since. Many points have been raised, and I am quite sure that no one will go away from here without having food for thought with reference to what I may call the present somewhat defenceless state of certain points on our coast. Whether the lecture should have had the name of "Coast Defence" or "The Defence of Coasts" is perhaps a moot point. For my part I think that Colonel Schaw simply meant to direct attention to that which the Navy must sooner or later come back upon, and that is our ports. There can be no question upon this subject, that whether we are to attempt a counter-attack or whether we are to wait for our enemy on our own shores, we must make safe our ports. The defence of our coasts, I quite agree with Captain Colomb, is one of the most important questions of the present day. I think it is one that comes more home to the hearts of Englishmen than perhaps any other, but I look upon it more as a general military question than as one for an Officer of engineers. With regard to organization, no one can doubt that in the present condition of things our ports are not as they ought to be. We have arms, and legs, and feet, but at present we are certainly deficient in the head. Nothing was brought out more clearly at Milford than that point, and I hope that the time is not far distant when those who have been mentioned to suggest some way out of the difficulty will hit upon a happy medium. Whether it is to be done by an artilleryman, an engineer, or a naval man I think matters little. I am quite sure that, whatever may be decided, patriotism and public spirit will do away with friction, and that the branch of the Service who may be for the time delegated to take the command will find that other branches of the Service will be only too glad to subordinate themselves to them. Therefore, although people are making rather a mountain of this, I believe myself it is more of a molehill. Whether the submarine mines are to be taken by the artillery, whether they are to be taken by the Navy, or whether they are to be left with ourselves, is a matter which we can hardly enter upon in this theatre, and therefore that subject, if you will allow me, I shall pass over without remark. Colonel Schaw has drawn attention to the grouping of guns, and the way in which the science of electricity has been brought to bear, so that they can be instantaneously fired upon any given object. I think it is only just to call your attention to another invention of a brother Officer of ours, Major Lothian Scott, who has brought the telescopic sight to such perfection that the artillery, in case of other things failing, would have that to fall back upon, so that all our eggs with regard to the firing of guns would not be in one basket. With regard to what Sir Andrew Clarke has said about iron, I think iron may be a good thing, but I am not one of those who say "there is nothing like leather," applying it to iron. I think that Colonel Schaw is right in his rejoinder that there is a time and place for all things, and that we shall find probably that we cannot do away entirely with iron. We cannot find sites which are always adapted to hydro-pneumatic guns. Sites and places and fixtures for guns must always depend upon station and condition, and I think we may be trusted in the Department to put iron where it is necessary, to use the hydro-pneumatic principle where it is most advantageous, and to put guns of all sorts in different positions with wisdom and due regard to experience. I think, gentlemen, I have nothing more to say except to remind you—and here General Hamley rather took the words out of my mouth—that this is the last time that Colonel Schaw will address us as one of ourselves. I am sure you will join with me in the feeling that one who has spoken to you words of wisdom, and who has addressed you upon many interesting subjects, must not part from us without great regret. Colonel Schaw has been of the greatest use to me, and being of use to me he has been of use to his country. Such a point as that comes well in this theatre, which is made so much use of for national purposes.

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SMALL ARMS FOR FIELD ARTILLERY.

By Major J. D. DOUGLAS, R.A.

THE question of arming gunners and drivers with weapons for personal defence has been discussed in various short papers of late in the pages of the "Journal of the Royal Artillery Institution."

I. Seeing how much the safety and unhampered action of field artillery depends on the protection and intelligent support of the other arms, the subject appears to me one which may interest those who support and are supported by artillery as well as those more immediately concerned. For those Officers then whose duties in the field keep them outside the line of guns, I venture to attempt to sketch the state of the case as it is at present, and to give as fair a *résumé* as I can of the various views held on it at present. Restricting the term field artillery to batteries of horse artillery and field batteries, that is excluding batteries of position and mountain batteries, the mounted non-commissioned officers and gunners are armed with cavalry swords, drivers are not armed at all, and all men carried on limbers, carriages, or wagons are practically unarmed.

II. The weapons actually issued to batteries are—

1st. Cavalry swords.—Every gunner of horse artillery has a sword hung to his belt. The preparation for action in the case of all batteries is expressed by the word of command "Off gloves, loop swords." The swords are on this order looped up so as not to interfere with the gunners' movements on foot, and become as useful to them for the time being as their gloves.

2nd. Twelve carbines.—These are securely strapped on the limbers. They are of no use in action, nor are they supposed to be. I disagree with those Officers who would wish to see them taken away, for they are most useful in any semi-hostile country for escorts of foraging parties, as I have seen practically proved.

3rd. Sword-bayonets for gunners of field artillery.—Like the carbines they are carried strapped on the carriages. But unlike the carbines, they are of little or no use when off the carriages. They serve to distinguish the gunner from the driver at church parades! Drivers on foot parades wear spurs and overalls. Roughly speaking, the use of the sword bayonet ceases when swan-neck spurs and foot-straps are discarded.

4th. Last, but very far from least, among the artilleryman's weapons I mention his gun. There are few who would disagree with me in saying that any weapon given him for self-defence which might induce him to desert his gun at a critical moment would defeat its own object. I consider a slung carbine or rifle is a weapon of this nature. Major Ollivant's battery of volunteer horse artillery carried slung rifles in Bechuanaland, but the service they were on was not of

the nature of regular warfare. An anonymous writer in the "Army and Navy Gazette," some twelve or thirteen years ago, advocated the issue of rifles and bayonets to gunners, so carried that the men might form rallying squares if their guns were rushed. Unslinging rifles and fixing bayonets would take up the time in which the last round of case might be fired, which perhaps would leave none of the enemy to carry the battery. It may surprise some to hear that I consider the cavalry sword as at present carried by artillery of the same detrimental character, in a less degree, as the rifle and bayonet. Either swords must be unlooped while the guns are being served, or they will remain in their scabbards, and the wearers be killed while going through the complicated motions necessary to disengage them.

III. The weapon which I, in common with many others, advocate for all ranks, is the pistol. The opponents of the pistol allege, as to gunners, that the gunner should depend on his gun only, and as to drivers that the danger of their making an improper use of firearms is so great as to outweigh the possible advantages of their having means of self-defence. It would appear that their views have at present more weight with the War Office than those of the advocates, and, as the adoption of pistols would entail some extra expense, we can scarcely expect the issue to be made until opinion is almost unanimous as to the necessity for the expenditure.

I scarcely know whether it is a subject for glory or regret that there is probably no Officer of Royal Artillery now serving who has seen horse or field battery guns successfully charged without an escort sufficiently close at hand to shoot down the few men who might get between the guns. I know of one instance, but it scarcely bears on the pistol question. It is the difficulty of getting the practical experiences of eye-witnesses which has induced me to come forward as a theorist. It is worth, I think, inquiring how a battery would behave in the two following cases:—

(a.) A battery in action is charged by lancers. The lancers are good men and the gunners staunch. Some forty lancers only get among the guns. Let Balaclava men say if this is impossible. I believe that with our present equipment the lancers can do what they like. The gunners can get between their wheels, and the lancers can steady their horses and pick them out from their cover like periwinkles. But if the gunners have pistols, the lancers will not steady their horses very easily, and whether the gunners first hit the lancers, or the lancers spear the gunners, would appear very even betting. I fancy the bravest of the enemy only would make an effort at spiking the guns, and the majority would ride on for the unarmed drivers. What would happen would be a question of temperament. Some drivers would dismount between their horses, and the lancers would have their choice of killing the drivers, killing the horses, or drawing their swords and cutting the traces. Other drivers would ride away, limbers and all, in spite of all orders to the contrary, and if the lancers came up with them would, with their whips only for arms, fall an easy prey. One lancer to each team would be sufficient to disable it in either case. If he were the mark for even the worst

aimed fire from three drivers and a gunner, I doubt if he would bring both himself and his horse out of action alive.

(b.) A battery on the move protected by a cavalry escort surprised by a body of cavalry of about the same strength as the escort. The escort charges and drives off the enemy. Only some twenty sabres of the latter, avoiding the shock, ride quietly up to the battery, and proceed to cut traces, spike guns, attack gunners, &c. In a field battery, who is to prevent them; the Officers and some fifteen mounted non-commissioned officers scattered about a long column or line, and fifty unarmed gunners and drivers without a lethal weapon amongst them? They can perhaps frighten the enemy's horses with their helmets and whips, but in what other way they can defend themselves or their guns, I scarcely know.

Both my cases, it will be observed, are taken from cavalry actions, because I think cavalry being unable as a rule to attack the fighting line of infantry will naturally be on the watch for opportunities of attacking artillery on the flanks and in rear. Infantry are scarcely likely to get among guns unless they are in overwhelming numbers; but should a few determined riflemen do so, it is at least as well that the gunners should have the choice of making a fight, rather than be forced to give up themselves and their guns as prisoners and trophies. I only advocate pistols for hand-to-hand fighting. The strongest argument against giving drivers pistols is that they might, by wild shooting, be almost as dangerous to their comrades as to the enemy; and if infantry did get among the guns and horses I have no doubt there would be wild shooting. The British infantry soldier may, or may not, be the coolest of all men in action, but neither trained riflemen nor artillery drivers can help their bullets going astray when friends and foes are almost locked in deadly fight. I read, and heard of from eye-witnesses, a case in point which occurred during the somewhat precipitate abandonment of the Hurnai passes during the Afghan War. A mob of unarmed followers were suddenly attacked in a defile by swordsmen of the Marri tribe. The escort of sepoy, who were over and over again a match for the Marri, were paralysed by the fear of shooting more followers than Marri, and the latter were only repulsed after they had cut down and thoroughly broken up the mass of coolies. The Officer commanding the escort may have been right or wrong then in holding back his fire. But if, instead of coolies, he had had to protect guns, gunners, and drivers, unarmed as our men are, he would have had no option but to have shot down, with a contemptible horde of savages, perhaps the equivalent in a general action of a battalion of infantry. I know the ground of which I am writing. A field battery passing through the gorge could be assailed in two ways by swordsmen. The swordsmen if kept at 20 yards distance could hurl down rocks, at the risk, of course, of being shot down easily by the escort, or if they came down hand to hand, they could cut down men and horses as they liked. Twenty reckless men could have stopped a battery, and blocked the road for all wheeled transport in rear of them.

IV. If I have been followed so far, the reader will understand the

want of small or side arms for field artillery, and the reasons I assign for considering the pistol as the proper weapon for both gunners and drivers.

In conclusion, I address a few words on the opinion of those who agree with me that arms are required, but who do not advocate the pistol as the weapon for all ranks. All, or nearly all, put the rifle or carbine aside, and I have only to deal with the advocates of the sword. Its main recommendation is that it cannot injure friends, and it is by some held to be a better defensive weapon than a pistol. In point of fact I believe it to be greatly in the way of a mounted man dismounted, and so embarrassing to limber and other gunners carried on the carriages, that they do not wear swords or sword bayonets. Moreover, although a thrust or blow can be parried, it is only for the horseman that it is a thoroughly good all-round weapon as compared with a pistol. There is, however, a sentiment which I should be the last to under-value, about the queen of weapons: keep it, I say, for mounted men, but hang it to the saddle, so that it may be drawn when wanted, but do not wear it neatly tucked under the waist-belt so that neither friend nor foe can draw it. A gunner's place in the field may be on his horse, on a carriage, or at his gun in action. In the first situation give him a sword by all means. It may be useful and is not in the way. Seated on the carriage he cannot use, or conveniently wear a sword. He may also be better without a pistol, but at least trust him not to fire without very urgent reasons. At his gun his proper work is working the gun, but if the enemy gets the wrong side of the muzzle his safest place is between the wheels. If he has a firearm ready to use from this point of vantage, the chances of his saving his gun and himself are greatly increased, which is about all the advocates of the pistol ask. If a driver has a sword, and is attacked on the off side, he cannot hurt his enemy, nor can the enemy, if similarly armed, hurt him. But he can cut up the off horse and harness as he likes. If a swordsman meets him bridle hand to bridle hand, neither side can do much, but if the enemy be pursuing on the near side of a team, the driver's whip is as useful to him as a sword would be. I have already pictured a driver dismounting between his horses for safety. If he can open fire from this position, his adversary will at least be puzzled how to approach within striking distance of him. Stress has been laid by some writers on the difficulty of teaching drivers to use a pistol when mounted. Shooting from horseback one says is so difficult that it requires a Dr. Carver to be successful. Another says that drivers tired of sitting inactive behind the guns in action would begin to fire and shoot those in front of them. To the first I reply that he exaggerates the difficulty, inasmuch as it is by no means difficult to take a steady aim from a galloping horse at another object moving at the same pace. Many men, far from being Dr. Carvers, have made good shooting in this way to my knowledge at deer, and I believe it is the ordinary recognized method of "hunting" the American buffalo. Of course, a fowling-piece with S.S.G. is a far better weapon for the purpose than a pistol. To the second I

reply that a mounted man if nervous would never fire between his horse's ears, and if he were not very nervous indeed, would not fire his pistol at all while the enemy was in front of the muzzles of the guns, seeing that he is scarcely likely to be himself less than twenty yards from the guns. I cordially agree with those who say that the pistol is almost a useless weapon to absolutely untrained men. I have used the term pistol throughout, as I do not think a revolver is so good a weapon for the purpose as a heavy double-barrelled pistol. Strong and straight for twenty yards should be looked on as the perfection of shooting. I should prefer a spherical bullet and smooth-bore barrel to the most elaborate small-bore rifled revolver.

It is highly probable that if my present (1st Army Corps) battery were sent on service at a week's notice, revolvers would be served out, and I should find myself with a number of delicate and complicated weapons, without practice ammunition, and a lot of men absolutely ignorant of their use. I cannot say personally what I shall do if this happens, but I shall not blame the pistol so much as the system, if I find the weapons the incumbrance which some Officers would consider them.

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This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

THE ENGINEER ARM IN CONTINENTAL ARMIES.

By Capt. W. A. H. HARE, R.E.

FRANCE.

THE FRENCH MILITARY ORGANIZATION.

BEFORE dealing with the French Engineers, it appears desirable to explain the present French military system in its general outline.

The present French military organization provides for an Active Army and a Territorial Army. Briefly, the latter comprises in principle the men that have served in the former. The terms of service, &c., will be given in detail further on (see p. 1190).

THE ACTIVE ARMY.

The Active Army comprises a Standing Army and a Reserve, the men in the latter, with few exceptions, having served in the former.

The Standing Army comprises the troops with the colours in France, Algeria, Tunis, and the Expeditionary Force in Tonquin. With only one very small exception, all military duty in the Colonies is performed by troops belonging to the Ministry of Marine.

The present Standing Army comprises—

Infantry:—

144 Regiments of Infantry of the Line, 30 Battalions of *Chasseurs à pied* or Rifles, 4 Regiments of Zouaves, 4 Regiments of Algerian *Tirailleurs* formerly known as *Turcos*, 2 Regiments of a Foreign Legion, 3 Battalions of African Light Infantry, and 4 Discipline Companies.¹

The Zouaves, *Tirailleurs*, Foreigners, Light Infantry, and Discipline Companies are for service in Algeria and Tunis. Of these the *Tirailleurs* are natives of Africa.

A Regiment of the Line or Zouaves consists of 4 Battalions of 4 Companies each and two Depot Companies, and a Battalion of *Chasseurs* of 4 Companies and a Depot Company. A Regiment of *Tirailleurs* or Foreigners consists of

¹ There is a fifth discipline company, but it is unarmed and called a company of pioneers.

4 Battalions of 4 Companies each and a Depôt Company, and a Battalion of Light Infantry of 6 Companies.

The 4 Battalions of a Regiment of the Line comprise 3 so-called "Active" or Field) Battalions, and a 4th or "Disponible" or "Fortress" Battalion.

Cavalry :—

12 Regiments of Cuirassiers, 26 Regiments of Dragoons, 12 Regiments of Hussars, 20 Regiments of *Chasseurs à cheval*, 4 Regiments of *Chasseurs d'Afrique*, 3 Regiments of *Spahis*, and 8 Remount Companies.

The *Chasseurs d'Afrique* and *Spahis* are for service in Algeria and Tunis. The latter are natives of Africa.

The Regiments are all of 5 Squadrons, except the Regiments of *Chasseurs d'Afrique* and *Spahis*, which are of 6. Of the 5 Squadrons, 4 are Field Squadrons and one is a Depôt Squadron.

Artillery :—

38 Regiments of Field Artillery, 16 Battalions of Garrison Artillery, 2 Regiments of Pontoneers, and 13 Companies of Workmen and Artificers.

The Regiments of Field Artillery are all grouped in Brigades of 2 Regiments each, one having 12 Field Batteries, and the other 8 Field and 3 Horse Artillery Batteries. 3 Field Batteries stationed in the Alps and 2 in Tonquin¹ have mountain equipment. There are besides, 9 extra Field Batteries for service in Algeria, of which 3 have mountain equipment, and 3 extra Batteries in Tonquin, 1 having mountain equipment. The total strength of the Field Artillery is then 440 Field and Horse Artillery Batteries and 9 Mountain Batteries. The Batteries are of 6 guns each in peace or war.

A Battalion of Garrison Artillery consists of 6 Batteries.

The Regiments of Pontoneers are of 14 Companies each.

Engineers :—

4 Regiments of 5 Battalions of 4 Companies of Sappers and Miners, a Depôt Company, a Railway Company, and a Train Company each. One Battalion of Sappers and Miners has recently been converted into a Railway Battalion.

Train :—

20 Squadrons of 8 Companies each, besides 16 Special Companies for Service in Algeria, Tunis, and Tonquin.

Gendarmerie :—

The Gendarmerie were reorganized by a Decree of last April (1886). The new organization is 18 Legions for the 18 Army Corps Districts, a Legion for the Military Government of Paris, a special Legion for Corsica, and a Legion for Algeria. The Republican Guard and the Colonial and Coast Gendarmerie remain as before. The Republican Guard is a special corps of 3 Battalions of 8 Companies each, and 8 Squadrons. Its expenses are borne half by the City of Paris and half by the War Ministry. The Colonial and Coast Gendarmerie comprise 4 and 5 Companies respectively. They are under the Ministry of Marine.

Companies are divided into Brigades, mounted and dismounted. According to the old organization, there were 2,385 of the former, and 1,932 of the latter in France and Algeria. The number of Companies in a Legion varies.

The French Gendarmerie, though performing certain civil police duties in peace, is a strictly military Corps, and enters into the composition of both Active and Territorial Armies.

PEACE STRENGTHS (*Effectifs Budgétaires*).

The Peace Establishment of the French Army is fixed by Law at 523,833 of all ranks, with 131,385 horses. Of the former, 26,974 are Officers, and the

¹ All references to the Expeditionary Force in Tonquin refer to the commencement of the present year (1886).

remainder, or 496,859, non-commissioned officers and men. 2·5 per cent. of the Officers, and 8·2 per cent. of the non-commissioned officers and men are reckoned on as non-effective or absent for various reasons, which reduces the actual Peace Strength to 26,341 of the former, and 456,727 of the latter, or 483,038 of all ranks.

At the commencement of the present year, of the 26,974 Officers, 23,233 were in France, 2,362 in Algeria, 645 in Tunis, 700 in Annam and Tonquin, 22 (Gendarmerie) in various Colonies, 9 (Spahis) in Senegal, and 3 (Veterinary Surgeons), attached to the Marine Artillery. Of the 496,859 non-commissioned officers and men, 407,585 were in France, 49,509 in Algeria, 15,086 in Tunis, 24,000 in Annam and Tonquin, 751 (Gendarmerie) in various Colonies, and 178 (Spahis) in Senegal. Of the horses, 110,808 were in France, 15,797 in Algeria, 4,482 in Tunis, 100 in various Colonies, 190 (Spahis) in Senegal, and 3 attached to the Marine Artillery.

The Peace Establishments of the various Arms, &c., are as follows :—

	Officers.	N.C. officers and men.	Total all ranks.	Horses.
Infantry	2,100	294,927	307,027	6,565
Cavalry	3,621	65,676	69,297	63,193
Artillery	3,369	68,240	71,609	31,818
Engineers	914	10,502	11,416	1,007
Train	412	11,428	11,840	9,954
Gendarmerie	787	25,048	25,835	13,152

Deducting 2·5 per cent. in the case of the Officers, and 8·2 per cent. in the case of the non-commissioned officers and men, gives the actual strength with the colours in any of these cases.

RECRUITING.

The French Army is recruited partly by the conscription and partly by voluntary enlistment, but mainly of course by the former.

The French conscript is taken nominally on the 1st July of the year in which he completes his 21st year, but does not join in practice till early in the following December. In Algeria he is taken nominally on the 1st April of the same year, but really on the 1st of the following September.

The annual contingent is divided into two portions by lot, the first being taken for a nominal service of five years, and the second for a nominal service of one year, with the colours.

The terms of service for the first portion for France and Corsica, are 5 years with the colours and 4 years in the Reserve of the Active Army, followed by 5 years in the Territorial Army, and 6 years in the Reserve of the Territorial Army.

In the case of the second portion of the French and Corsican Contingent and the whole Contingent (French) of Algeria,¹ the men pass into the Reserve after one year's service with the colours, and remain in it for eight years. In other respects the terms of service are the same.

As a matter of fact, the 5 years' service with the colours means 46 months

¹ Algeria is the only French Colony in which Frenchmen are liable to compulsory military service.

at the outside instead of 60, and the 1 year's service 10 months instead of 12. In reality it is less.

Volunteers or enlisted men are of two kinds, viz., men enlisted for five years with the colours, and one-year Volunteers—a copy of the German institution. An advantage given to Volunteers is that they are taken much younger than conscripts.

The population of France and Corsica may be taken at 38,000,000, and the number of young men that figure in the beginning of January as having completed their 20th year in the preceding year, at some 312,000, or roughly, about 8 per 1,000 of the total population. Of these, some 47,000 may be said to be totally unfit for military service of any kind. Deducting these, exemptions, recruits for the Navy, &c., the Standing Army is supposed to take annually some 156,142 recruits; of these, 138,751 are conscripts, 12,807 five-year volunteers, and 4,584 one-year volunteers.

Of the conscripts, 96,727 are nominally taken for five years' and 40,724 nominally for one year's service with the colours, besides 1,300 for the latter period in Algeria, out of the 2,600 young Frenchmen annually available for military service in that Colony.

We have seen that the Peace Strength is fixed by Law at 523,833 of all ranks. But of these there is a permanent portion comprising—

26,974 Officers.
25,048 Gendarmes.
15,879 Re-engaged men.
5,214 Foreigners.
11,885 Algerines and Tunisians.
5,087 <i>Disciplinaires</i> , or men undergoing punishment service.

Total 90,087 of all ranks.

Deducting these and the year's contingent of recruits, together 246,229, from the Peace Strength, there remain but 277,604 for the remainder, or men nominally called upon to serve for four years more with the colours. Now the annual contingent of such men, it has been shown, amounts to 109,534, and three such contingents would, deducting casualties,¹ amount to 307,111, so that four years' service with the colours is out of the question, and an average of a little over three much nearer the actual truth.

To make the two ends—the Budget and the Peace Strength—meet, recourse is had to furloughs on a large scale, and renewed from time to time (*congé renouvelable*).

The number of men annually enlisted for the Foreign Legion is 2,920, and for the Algerian and Tunisian troops 1,655. The latter receive a bounty of 400 fr. (16*l.*).

The terms of service are the same for all arms except the Cavalry and Railway Companies of the Engineers. These take no men of the second portion of the contingent.

France, including Corsica, but with the exception of the department of the Seine, the department of the Seine-et-Oise, and the City of Lyons with four cantons of the department of the Rhone (Neuville, Givors, Villeurbanne, and Saint Genis-Laval), is divided into 18 Army Corps Districts or *régions*, and these again into 144 Sub-districts or *Subdivisions de région*. In each of these there is a Recruiting Centre or Office, or *Bureau de Recrutement*.

To this Bureau belong all men liable to military service in the Sub-district except men belonging to arms other than the Infantry of the Territorial

¹ French military statistics show that a contingent loses 4 per cent. of its strength after a year's service, 3 per cent. after 2 years' service, and 2 per cent. after every additional year's service.

Army. These belong to a special Bureau at the Headquarters of the District itself.

Besides these 144 Recruiting Offices, there are 9 others in France, and 3 in Algeria. These are:—1 additional office at Digne in the Aix Sub-district, 1 at Lyons for the City of Lyons and the cantons already alluded to, 1 at Versailles for the department of the Seine-et-Oise, and 6 in Paris for the department of the Seine. The 3 offices in Algeria are at Algiers, Oran, and Constantine respectively.

The total number of Recruiting Offices in France and Algeria is then 156.

The French Army, for reasons chiefly political in their nature, is not territorially recruited. Both conscripts and enlisted men for five years' service are invariably sent to serve in Corps and Regiments at a considerable distance from the Sub-district they are raised in. Only men called upon to serve for a year may be said to be in any way territorially recruited, that is to say, are posted to Corps and Regiments the dépôts of which are in or near the Sub-districts they come from.

On the other hand, the Reserve of the Active Army and the Territorial Army are "territorial," or as the French call it *régional*, all men *en disponibilité*, in the Reserve, and in the Territorial Army with its Reserve, joining, with few exceptions, in case of mobilization, the Corps and Regiments of their respective arms that happen to be in their Sub-districts.

Thus, only in the case of those who had served ten months or so with the colours, would Reserve men *ever rejoin, except as an accident, the Regiment they had served in.*

Conscripts taken in Algeria are sent to serve their year's service in the South of France, if born in Algeria, but if born in France, are posted to Corps and Regiments in the Colony.

In the case of the Engineers, the men of the first portion are chosen from the whole contingent throughout France, and distributed to the four Regiments. The men of the second portion are taken from four groups of Sub-districts, roughly representing the four quarters of France. The men for the Railway Companies are taken from the contingent throughout the country.

Thus, without going any further, the French system of recruiting and mobilization may be seen at a glance to be wanting in the very first principle which governs the German—the mainspring in fact of the whole machine of which it is a copy.

TERRITORIAL ORGANIZATION.

France, including Corsica, is divided into 18 Army Corps District Commands and two Military Governments of Paris and Lyons. Each Army Corps District is again divided into 8 Sub-district Commands.

In each Army Corps District are supposed to be quartered, in theory, the troops which, when mobilized, would form a complete Army Corps, besides other troops such as Cavalry, Garrison Artillery, &c., not forming part of Army Corps.

The former, or the troops forming part of the Army Corps, are briefly: 2 Divisions of Infantry, a Battalion of Chasseurs, a Brigade of Cavalry, a Brigade of Artillery, a Battalion of Engineers, a Squadron of Train, and a Legion of Gendarmerie, besides non-combatants or Administrative Services.

But these are by no means always to be found quartered in their respective Army Corps Districts. The Dépôts of Infantry and Cavalry Regiments and Chasseur Battalions always remain in their proper Sub-districts no matter where the Regiments or Battalions may be. The Artillery Brigades remain with certain small detachments in their own Districts, with the exception of the Artillery Brigade of the Algerian Army Corps which is stationed at Vincennes. But the Engineer Battalions and Pontoneer Regiments have

practically no connection in peace with Army Corps, as will be seen further on. Of the two *Dépôt* Companies of a Zouave Regiment, one is quartered in Algeria and the other in the South of France.

The two Infantry Divisions of an Army Corps should always comprise 24 Field Battalions of Infantry of the Line. But this is, at present at any rate, not the case, the numbers varying from 12 to 30. Again, the Military Government of Paris borrows its three Infantry Divisions, so to speak, from three separate Army Corps, and that of Lyons its Infantry Division and Brigade from two Army Corps, and one Brigade in the South of France sends its Regiment alternately for service in Corsica. All these troops are changed every three years.

The 4th Battalions of Infantry Regiments are, many of them, detached from the Regiments they belong to, 17 at the beginning of the present year being in Algeria and Tunis, and 3 in Tonquin. Of the *Chasseurs à pied* only 12 were in their proper Districts, 5 being in Algeria and Tunis, and 1 in Tonquin. Of the 12 Battalions not belonging to Army Corps, 8 were stationed near the German frontier and 4 near the Italian frontier. The Cavalry Brigades were all in their respective Districts except one. The Engineer Battalions are all with the Headquarters of the four Engineer Regiments with certain detachments, and only three Engineer Battalions are actually in the Districts of the Army Corps to which they would belong, on mobilization. The Squadrons of Train and Legions of *Gendarmerie* are in their proper Districts. The two Regiments of Pontoneers are entirely stationed, with one detachment, in two Army Corps Districts.

All troops in an Army Corps District or Military Government are under the General Commanding it. As a rule the troops in the Sub-district Commands corresponding to the four Infantry Regiments of a Division are under the General Commanding that Division, and the troops in the two Sub-districts corresponding to the two Infantry Regiments of a Brigade are under the General Commanding that Brigade. There are, however, a good many exceptions to this rule—at the beginning of the present year in eight Districts. As regards Paris, the troops in the Department of the Seine are under the General Commanding the City of Paris, and those in the *Seine-et-Oise* under the General Commanding that Department. The troops in the Department of the Rhone are under the General Commanding the City of Lyons.

In each District there is a complete Permanent Staff divided into an Active Section and a Territorial Section. The former would take the field with the General. The latter would remain behind, at any rate at the outset of hostilities, under a General that would be specially appointed at the time.

The numbering of the Infantry Divisions and Brigades is the same as in the Prussian Service, that is to say, the 1st and 2nd Divisions belong to the 1st Army Corps, and the 1st and 2nd Brigades to the 1st Division, and so on. The Cavalry and Artillery Brigades, the Engineer Battalion, the Train Squadron, the *Gendarmerie* Legion, and the various Sections of Medical, Administrative, and Supply Sections, all bear the number of the Army Corps. The Regiments of Infantry and Cavalry and Battalions of *Chasseurs* are independently numbered. The Cavalry not required for the Army Corps Brigades are organized in independent Brigades and Divisions.

The Army Corps are known by the Roman numbers I to XVIII.

Besides these there is a special Army Corps, the XIXth, for Algeria. It is organized in three Divisions, not numbered, but known as those of Algiers, Oran, and Constantine. It comprises the special troops already alluded to and certain detachments from the Army in France and Corsica.

At the beginning of the present year there were of the latter, 10 Battalions

of Infantry of the Line (*disponibles*, or 4th) 3 Battalions of Chasseurs, 2 Regiments of Hussars, 6 detached Squadrons of Chasseurs à cheval, 9 detached Batteries of Field Artillery, a detached Company of Pontoneers, 3 detached Companies of Engineers, and 10 detached Companies of Train.

The 12th Brigade of Artillery, the 19th Battalion of Engineers, and the 19th Squadron of Train are in France.

The 19th Legion of Gendarmerie is in the Colony.

Besides the XIXth Army Corps and Military Governments, there remain the Division in Tunis and the Expeditionary Force in Tonquin.

The former is made up of detachments from the XIXth Army Corps and from France. It is organized in three Subdivisions under Brigadier-Generals, and comprised, at the beginning of the year, a Regiment of Zouaves, a Regiment of Algerian Tirailleurs, a Discipline Company, a Regiment of Chasseurs d'Afrique, and 3 squadrons of Spahis, belonging to the XIXth Army Corps; besides 7 Battalions (*disponibles*) of Infantry of the Line, 2 detached Battalions of Chasseurs, 2 detached Squadrons of Hussars, 3 detached Batteries of Artillery, 1 detached Battery of Garrison Artillery, a detached Company of Engineers, 4 detached Companies of Train, and detachments of medical, administrative, and supply services, from France and Corsica.

At the commencement of the present year the force in Tonquin comprised 3 Battalions (*disponibles*) of Infantry of the Line, 1 Battalion of Chasseurs, 3 Battalions of Zouaves, 2 Battalions of African Light Infantry, 4 Battalions of the Foreign Legion, 4 Battalions of Algerian Tirailleurs, a Squadron of Chasseurs d'Afrique, 3 Squadrons of Spahis, 10 batteries of Artillery, and 2 Companies of Engineers, besides detachments of Train, &c. This, of course, excludes troops of the Marine Infantry and Artillery, which belong to the Admiralty.

The only other detachment (if we exclude Gendarmerie) furnished by the Army for duty in the Colonies is at present a Squadron of Spahis for duty in Senegal, styled *Escadron de Spahis Sénégalais*.

All other military duty in the Colonies is undertaken by the Marine Infantry, Artillery, &c. These troops do not do duty on board ship, however, like our Marines.

The above is a rough outline of the present organization of the Active Army. It is especially interesting, taken as it is at the beginning of the present year, as showing how difficult a military system copied from the German, and intended for national defence, can be made to agree with an aggressive Colonial policy.

TERRITORIAL ARMY.

The following is a brief description of the organization, in theory at any rate, of the French Territorial Army.

Infantry:—

144 Regiments corresponding to the 144 sub-districts, or 8 Regiments per Army Corps. Each Regiment is of 3 Battalions of 4 Companies each, and a dépôt Company. The cadres are laid down as the same as for the Active Army, except that a Regiment would be commanded by a Lieutenant-Colonel. In the Sub-district of Aix, in the XVth Army Corps District, there is a second Regiment. Thus the total paper strength is 145 Regiments, or 435 Battalions. There are also 9 Territorial Battalions of Zouaves, bringing the total number of Battalions of Infantry up to 444, with 154 dépôt Companies.

The Infantry Regiments are numbered consecutively throughout the 18 Army Corps Districts, Nos. 1 to 8 belonging to the 1st Army Corps District, 9 to 16 to the IInd Army Corps District, and so on.

Cavalry:—

8 Squadrons to each Army Corps District, besides 4 Territorial Squadrons of Chasseurs d'Afrique, or 148 Squadrons in all.

Artillery:—

1 Territorial Regiment to each Army Corps District bearing its number. The number of batteries in a Regiment varies according to circumstances from 8 to 30. There are 13 Territorial batteries in Algeria and 6 local batteries in the 1st Army Corps District, bringing the total number of batteries up to 287.

Engineers:—

18 Battalions of Engineers, or 1 to each Army Corps District, bearing its number. The number of Companies varies according to circumstances, at present from 2 to 9, giving 61 in all. There are 4 Territorial depôts for these Battalions, one at each of the Schools of Military Engineering.

TRAINING OF THE RESERVES AND TERRITORIAL ARMY.

Two entire classes of the Reserve of the Standing Army are annually called out for training during the period of the Autumn Manœuvres, in the case of the infantry, engineers, garrison artillery, pontoneers, and Railway Companies. The classes are—the one about to pass into the Territorial Army, and the next behind it but one. In the case of the cavalry and field artillery the oldest of these classes is called out for the manœuvre period, but the other for a period after the manœuvres, or from the 25th September to the 12th October. The Reserve men of the Gendarmerie are only kept for ten days, viz., from the 1st to the 10th September; the Reserve men of the Train, &c., are called out at various periods, according to orders from the War Ministry.

The men of the Territorial Army are only called out for a period of thirteen days' training, including the day of arrival and departure, during the five years they figure in it. The classes are each called out or two consecutive years, half at a time. Thus in 1886 and 1887 half of the 1874 and 1875 classes would be called out together, in 1888 and 1889 half of the classes of 1876 and 1877, and so on.

The training takes place at two periods of the year, viz., in the spring and autumn. The spring training takes place in the end of April and beginning of May, and the autumn training in October. Infantry, artillery, engineers, and Gendarmerie are called out in the spring, and cavalry in the autumn. Train, &c., are called out at various periods, according to orders issued, on the subject by the War Ministry.

The training of the Engineers of the Territorial Army takes place at the four Schools of Military Engineering.

Officers of the Territorial Army are called out for training nominally every two years for a period of fourteen days at a time, but Officers of the Engineer Staff of the Territorial Army only by special Ministerial order.

THE PEACE DISTRIBUTION OF THE STANDING ARMY.

The distribution of the Standing Army in the beginning of the present year (1886) is given in the accompanying table.

THE ENGINEERS OF THE FRENCH ARMY.

Introductory.

The Engineers in the French Army are known as the *Corps du Génie*, with military men simply as *le Génie*, or generally as *le Génie Militaire*, to distinguish it from *le Génie Civil* or Civil Engineers. The term *Ingenieur* is never applied to Engineer Officers.

The French Engineers comprise a certain number of General Officers shown

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Table showing the Distribution of the Standing Army in t

Command and headquarters.	Infantry.													Fie squad
	Regiments of the line.			Chas- seurs à pied.		Regi- ments of Zouaves.		Regi- ments of Tirail- leurs.		Foreign legion.		Light Infantry.		
	Field battalions.	Disponible or fortress battalions.	Depôt companies.	Battalions.	Depôt companies.	Battalions.	Depôt companies.	Battalions.	Depôt companies.	Battalions.	Depôt companies.			
1st Army Corps (Lille)	24	7	16	1	1	..	..	..	..	..	..	..	8
2nd " " (Amiens)	18	1	16	1	1	..	..	..	..	..	..	..	8
3rd " " (Rouen)	12	6	16	1	1	..	..	..	..	..	..	..	8
4th " " (Le Mans)	12	5	16	..	1	..	..	..	..	..	..	..	8
5th " " (Orleans)	12	5	16	..	1	..	..	..	..	..	..	..	8
6th " " (Châlons)	30	26	16	9	9	..	..	..	..	..	..	..	8
7th " " (Besançon)	24	7	16	2	2	..	..	..	..	..	..	..	8
8th " " (Bourges)	24	4	16	1	1	..	..	..	..	..	..	..	8
9th " " (Tours)	24	4	16	1	1	..	..	..	..	..	..	..	8
10th " " (Rennes)	24	3	16	1	1	..	..	..	..	..	..	..	8
11th " " (Nantes)	24	3	16	1	1	..	..	..	..	..	..	..	8
12th " " (Limoges)	24	3	16	..	1	..	..	..	..	..	..	..	8
13th " " (Clermont-Ferrant) ..	12	3	16	..	1	..	..	..	..	..	..	..	6
14th " " (Lyons) and Military Government of Lyons	36	12	16	3	3	..	..	..	..	..	..	..	8
15th Army Corps (Marseilles) ..	24	7	16	2	2	..	4	..	..	..	..	..	8
16th " " (Montpellier)	24	6	16	..	1	..	..	..	..	..	..	..	8
17th " " (Toulouse)	24	4	16	..	1	..	..	..	..	..	..	..	6
18th " " (Bordeaux)	24	4	16	1	1	..	..	..	..	..	..	..	6
Military Government of Paris	36	12	..	..	..	..	..	..	..	..	..	..	..
19th Army Corps .....	..	10	..	3	..	} 13	4	12	4	4	2	1	{ 4 2
Division in Tunis	7	..	2
Expeditionary force in Tonquin ..	..	3	..	1	..	3	..	4	..	4	..	2	..
Senegal .....	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	432	142	288	30	30	16	8	16	4	8	2	3	144	

ing Army in the beginning of the present Year (1886).

Depot companies.	Battalions African Infantry.	Cavalry.						Artillery.						Engineers.						Gendarmerie legions.	Discipline companies.
		Field squadrons.		Depôt squadrons.	Squadrons, Chasseurs d'Afrique.	Squadrons, Spahis.	Remount companies.	Field batteries.	Horse artillery batteries.	Mountain batteries.	Garrison batteries.	Pontooner companies.	Sapper companies.	Railway companies.	Train companies.	Depôt companies.	Train companies.				
		Army Corps.	Independent.																		
8	12	5	..	..	..	19	2	..	9	..	16	..	1	1	3	1		
8	4	3	..	..	..	20	2	..	3	..	..	..	..	..	3	1
8	..	2	..	..	..	20	3	..	1	..	..	..	..	..	3	1
8	..	2	..	..	..	20	2	..	..	..	..	..	..	..	3	1
8	16	6	..	..	..	20	5	..	..	..	1	..	..	..	3	1
8	44	13	..	..	..	26	8	..	30	..	4	..	..	..	3	2
8	4	3	..	..	..	19	3	..	14	..	3	..	..	..	3	2
8	..	2	..	..	..	20	2	..	2	..	..	..	..	..	3	1
8	8	4	..	..	..	19	3	..	..	14	..	..	..	..	3	2
8	..	2	..	..	..	20	2	..	4	..	..	..	..	..	3	1
8	..	2	..	..	..	19	2	..	3	..	..	..	..	..	3	1
8	..	2	..	..	..	20	2	..	..	..	..	..	..	..	3	2
8	..	2	..	..	..	20	2	..	..	..	..	..	..	..	3	2
6	..	2	..	..	..	20	2	..	..	..	..	..	..	..	3	2
8	16	6	..	..	..	18	4	3	10	..	16	..	1	1	3	2		
8	..	2	..	..	..	20	3	..	1	13	3	..	..	..	3	3
8	..	2	..	..	..	16	2	..	2	..	16	..	1	1	3	2		
6	..	2	..	..	..	19	3	..	..	..	..	..	..	..	3	2
6	..	2	..	..	..	17	3	..	3	..	..	..	..	..	3	2
..	24	6	..	..	..	14	4	..	7	..	12	8	1	1	6	1		
{ 4	8	2	23	14	3	{ 6	..	3	..	1	3	9	1					
{ 2	1	3	..	3	1	..	1	4	..					
..	9	..	3	1	3	..					
..	1	—	—	—	—	—	—	—	—	—	—	—					
2	3	144	136	70	24	18	8	384	57	9	90	28	76	8	4	4	76	31	4		

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on the same general list of General Officers (known as the *Etat Major-Général de l'Armée*), much the same as with us, a Corps of Field Officers, Captains, and Subalterns, and 4 Regiments of Engineers officered from this Corps.

Field and other Officers of Engineers not belonging to these Regiments constitute what is called the "Engineer Staff," or *Etat Major particulier du Génie*, to which belong, in addition, a certain number of *employés* known as *Adjoints du Génie*, corresponding somewhat to our clerks or foremen of works. They are appointed from non-commissioned officers of Engineers. To the Engineer Staff also belong a few *employés*, known as *ouvriers d'Etat*, or foremen of works, and a variable number of *stagiaires* or non-commissioned officers of Engineers—probationary *Adjoints du Génie*—besides certain *employés* known as *portiers consignés* or barrack sergeants. Of these the names of the *Adjoints du Génie* alone are given in the *Annuaire* or Army List.

PART I.—OFFICERS.

Numbers and Establishment.

The French *Etat Major-Général de l'Armée*, or List of General Officers, comprises—

Field-M Marshals (*Maréchaux de France*).

Divisional Generals (*Généraux de Division*).

Brigadier-Generals (*Généraux de Brigade*).

According to the Law of the 4th August, 1839, the number of Field-M Marshals was limited to six in peace, but might be exceeded in war. By the Law of the 13th March, 1875, appointment to the rank of Field-M Marshal can only be made by passing a special Act for the purpose, so that for the time being the rank is virtually abolished.

At the beginning of the present year there were only three Field-M Marshals—all unemployed—the well-known French Generals Canrobert, MacMahon, and Lebœuf.

General Officers are by the Law of the 13th March, 1875 (Art. 8), now classed in two sections, the first comprising General Officers on the active list employed and unemployed, or *en activité et disponibilité*, and the second General Officers on the Reserve List.

The establishment of the first is fixed at—

100 Divisional Generals.

200 Brigadier-Generals.

Divisional Generals who have distinguished themselves on active service may be retained in the first Section till 70 years of age.

The second Section comprises Divisional Generals over 65, and Brigadier-Generals over 62 years of age. It also comprises certain General Officers temporarily unfit for service for medical reasons. These may be called upon to serve when such reasons cease to exist, provided, of course, they are within the limits of age.

Promotion to the rank of Brigadier and Divisional General is made by selection. A Colonel to be promoted to the former rank must have at least three years' service in his rank. Selection lies with the Committee on Promotion at the War Ministry, or the *Commission de Classement*.

According to the *Etat du Corps du Génie* for 1885, there were in the first Section of the list of General Officers nine Divisional Generals of Engineers, or *Officiers Généraux provenant du Corps du Génie*. Two of these were retained in the first Section for distinguished services, viz., Faidherbe and Farre, both Senators, but unemployed. The remaining 6 were all employed, viz., 1 as

President of the Committee on Fortifications; 1 as member of the same; 1 as Commanding Engineer of the Military Government of Paris; 1 as a member of the Committee on Artillery; 1 as a member of the mixed Committee on Public Works, and 2 as commanding Infantry Divisions.

There were 22 Brigadier-Generals in the first Section. Of these, 21 were employed in a military capacity, viz., 1 as Commanding Engineer in Algeria; 1 as Commandant of the Practical School for Artillery and Engineers at Fontainebleau; 1 as Engineer Director at Paris; 1 as Assistant Chief of the General Staff at the War Ministry; 1 as commanding a Brigade in Tonquin; 1 as Chief of the General Staff of an Army Corps; 1 as commanding a Cavalry Brigade; 1 as commanding a Sub-district of an Army Corps District; 2 as commanding Infantry Brigades; 3 as members of the Committee on Fortifications; and 8 as Commanding Engineers of Army Corps Districts. One was shown as a *Conseiller d'Etat en Service Ordinaire*, or in civil employ.

There were no Divisional but 2 Brigadier-Generals in the 2nd or Reserve Section.

There were 7 Divisional and 25 Brigadier-Generals on the Retired List (*en retraite*). Two of these were Senators.

The establishment of the Corps is, by the Law of the 13th March, 1875, fixed as follows:—

Engineer Staff (Etat Major particulier du Génie)—

(a.) *Officers:—*

33	Colonels.		
33	Lieutenants-Colonels.		
124	<i>Chefs de bataillon.</i>		
148	First Captains (<i>Capitaines de 1e Classe</i>).		
148	Second	"	" 2e "

Total 486 of all ranks.

(b.) *Adjoints du Génie:—*

20	<i>Adjoints principaux de 1e Classe.</i>		
100	"	" 2e "	
100	<i>Adjoints de 1e Classe.</i>		
150	"	" 2e "	
200	"	" 3e "	

Total 570 of all ranks.

Engineer Regiments—

4	Colonels.
4	Lieutenant-Colonels.
24	<i>Chefs de bataillon</i> and Majors.
4	<i>Officiers d'habillement</i> (Captains).
4	Paymasters (Captains).
4	Ensigns (2nd or Sub-Lieutenants).
4	Assistant Paymasters (Subalterns).
92	First Captains commanding Companies or <i>Capitaines Commandants</i> .
98	Second Captains of Companies or <i>Capitaines en 2d</i> .
92	First Lieutenants or <i>Lieutenants en 1er</i> .
92	Second Lieutenants or <i>Lieutenants en 2d</i> .

Total 422 of all ranks.

There are besides a certain number of Sub-Lieutenants not fixed by estab-

lishment. Of these, the majority are studying at the Practical School at Fontainebleau, and these are shown as belonging to the Engineer Staff; the remainder belong to the Engineer Regiment. Of the former there were 101, and of the latter 30, shown in the *Etat du Corps du Génie* for 1885.

The total fixed establishment of the Corps is therefore 898 Officers and 570 *Adjoints du Génie*.

The total establishment according to the Budget for the present year is 914 Officers and 10,502 non-commissioned officers and men, with 1,007 horses.

Above the rank of First Lieutenant all Engineer Officers are equally available for duty with the Engineer Staff or Regiments.

Adjoints du Génie belong to the category of commissioned Officers, and their names figure in the Army List. They are a military body sworn to allegiance (*un corps assermenté*). They have Officer's rank but not Officers' titles.

Besides the *Adjoints du Génie*, the Engineer Staff comprises a variable number of non-commissioned officers attached to it, qualifying for *Adjoints du Génie* of the 3rd Class. They are styled *sous-officiers stagiaires*, and are supernumerary to the Regiments they belong to. If after their probationary service they are found unfit for *Adjoints du Génie*, they revert to their Regiments.

The Engineer Staff also comprises another kind of *employé*, styled *ouvrier d'Etat* or foreman of works, but they do not hold Officer's rank. There are only six of these, they are all employed at the four Schools of Military Engineering. They are appointed from non-commissioned officers.

Barrack sergeants or *portiers consignés* also belong to the Engineer Staff. The establishment of these is fixed at—

130 *Portiers Consignés de 1e Classe.*

90	"	"	2e	"
72	"	"	3e	"

Total 292

The *Etat du Corps du Génie* for 1885 gives a list of—

36 Colonels and 3 <i>hors cadre</i> or Supernumerary.				
36 Lieutenant-Colonels and 4 <i>hors cadre</i> or Supernumerary.				
148 <i>Chefs de Bataillon</i>	"	11	"	"
239 First Captains	"	8	"	"
204 Second Captains	"	1	"	"
93 First Lieutenants.			"	"
44 Second Lieutenants.			"	"
131 Sub-Lieutenants.				

Or a total of 931 of all ranks.

The *Liste d'Ancienneté* in the Army List for the same year differs slightly from this, the numbers borne on the strength of the Corps being 37 Colonels, 37 Lieutenant-Colonels, 147 *Chefs de Bataillon*, 224 First Captains, 225 Second Captains, 72 First Lieutenants, 65 Second Lieutenants, and 132 Sub-Lieutenants, or a total of 939 of all ranks.

Of the Officers Supernumerary, 1 Colonel was President of a mixed Commission at the War Ministry, 1 Lieutenant-Colonel on special duty in Turkey, and 1 *Chef de Bataillon* in the Recruiting Department; the remainder were on the General Staff.

There were besides the following on special duty, but not shown as supernumerary :—

1 Colonel and 2 *Chefs de Bataillon* as Military Attachés to Embassies abroad, and 1 *Chef de Bataillon* on special duty in Morocco.

1 Colonel commanding a Sub-district in Algeria.

18 First and Second Lieutenants employed as aides-de-camp and *Officiers d'Ordonnance* to General Officers.

8 First and Second Captains studying at the Staff College.

2 Brigadier-Generals employed on the *Conseil d'Etat*.

1 Brigadier-General, 3 Lieutenant-Colonels, 8 *Chefs de Bataillon*, 20 Captains, and 2 Lieutenants, employed in training and educational establishments other than the four Schools of Military Engineering, but of these 1 *Chef de Bataillon* and 3 Captains were on the Retired List.

1 retired Colonel and 1 *Chef de Bataillon* employed under the Ministry for Public Works, and 1 *Chef de Bataillon* under the Ministry of the Interior.

There were altogether 31 Officers of various ranks on the General Staff, and 5 *Chefs de Bataillon* and 18 Captains shown as *brevetés*, or as having passed the Staff College.

5 Colonels, 1 Lieutenant-Colonel, 7 *Chefs de Bataillon*, and 5 First Captains, were *ex-Officers* of the Staff Corps broken up in 1880. Of these, only 3 originally came from the *Ecole Polytechnique*, the remainder having been students at the School of St. Cyr (see p. 1196).

The Reserve List of the Active Army comprises—

Captains.—1 pensioned Captain of Engineers, and 33 2nd Class Government Civil Engineers ranking as Captains.

Lieutenants.—4 retired Lieutenants of Engineers, and 68 3rd Class Government Civil Engineers, besides 7 *hors cadre* or Supernumerary.

Sub-Lieutenants.—90 Civil Engineer Students serving conditionally, in the employ of Railway Companies.

This gives a total of—

34 Captains.
72 Lieutenants.
90 Sub-Lieutenants.

The Supernumerary Officers were in Naval employ, and as such are not available for Military duties.

The Territorial Army comprised—

12 pensioned Colonels of Engineers,

14 pensioned Lieutenant-Colonels of Engineers, 1 First Class Chief Civil Engineer, and 50 Second Class Chief Civil Engineers with the rank of Lieutenant-Colonel,

45 pensioned *Chefs de Bataillon* of Engineers, 123 First Class Civil Engineers, and 3 retired Captains of Engineers (without a pension),

3 pensioned Captains of Engineers and 67 Second Class Government Civil Engineers, and 14 retired Captains of Engineers (with pension),

18 First Lieutenants,

36 Second Lieutenants,

158 Sub-Lieutenants,

giving a total of 444 of all ranks.

The Government Civil Engineers are all graduates of the *Ecole Polytechnique*.

Recapitulation.

Active Army.....	931 of all ranks.
Reserve	196 "
Territorial Army	444 "
	<hr/>
	1,571 "

Appointment and Promotion.

Engineer Officers are appointed in two ways, viz., from students of the *Ecole Polytechnique* at Paris and from non-commissioned officers of the corps. The latter system has only been quite recently introduced.

The *Ecole Polytechnique* prepares young men for various public services, civil, military, and naval, viz., for the Artillery of both Land and Marine Forces, the Corps of Military Engineers, Naval Architects and Constructors, the Navy, the Corps of Naval Hydrographers, Civil and Mining Engineers, the Powder and Saltpetre Works, the State Telegraphs, and the State Tobacco Manufactories.

Candidates are admitted by competitive examination, and the normal course of study lasts two years.¹

Successful candidates for the Engineers are appointed Sub-Lieutenants in the corps, but before they join for duty, have to go through a course of instruction at the Practical School of Artillery and Engineers, or *Ecole d'Application d'Artillerie et du Génie*, at Fontainebleau. This course lasts two or three years at the most, after which, if the Sub-Lieutenant passes the prescribed final examination, he is posted to the corps as Second Lieutenant, and joins an Engineer Regiment for duty.

This School was at Metz before the Franco-German War. Its object is to give practical and technical instruction to young Officers of the Artillery and Engineers, as well as the Marine Artillery. All students join with the rank of Sub-Lieutenant.

The number of Sub-Lieutenants admitted is annually fixed by the War Ministry. Sub-Lieutenants who are allowed a third year's study, and then fail, are removed.

Non-commissioned officers of Engineers may be given commissions after going through a year's course at the new School for non-commissioned officers of Artillery and Engineers at Versailles. They must have served five years altogether with the colours, and one year as *sous-officier*. They must pass an examination to enter the School, and be reported as fit for a commission.

After leaving the School, they are posted to the Engineer Regiments with the rank of Sub-Lieutenant, and are promoted Second Lieutenant after two years' service in this rank. They may, on their own application, be admitted

¹ The French military training establishments are—

The *Ecole Supérieure de Guerre*, at Paris, or Staff College.

The *Ecole Polytechnique*, at Paris.

The *Ecole Spéciale de St. Cyr*.

The *Ecole d'Application de l'Artillerie et du Génie*, at Fontainebleau.

The *Ecole d'Application de Cavalerie*, at Saumur.

The *Ecole d'Application des Poudres et Salpêtres*, at Paris.

The *Ecole de Médecine et de Pharmacie Militaire*, at Paris.

The *Ecole d'Administration*, at Vincennes.

The *Ecole Normale de Gymnastique*, at Joinville-le-Pont (near Paris).

The *Ecole Normale de Tir*, at Châlons-sur-Marne.

The *Ecoles Régionales*, at the camps at Châlons, Le Ruchard, and Le Valbonne.

The *Ecoles d'Artillerie* at Douai, La Fère, Versailles, Le Mans, Orleans, Châlons, Bézançon, Bourges, Poitiers, Rennes, Vannes, Angoulême, Clermont-Ferrand, Grenoble, Nîmes, Castres, Toulouse, Tarbes, and Vincennes.

The *Ecoles Régimentaires du Génie*, at Versailles, Montpellier, Arras, and Grenoble.

The *Ecole Militaire d'Infanterie*, at St. Maixent.

The *Ecole des Sous-Officiers de l'Artillerie et du Génie*, at Versailles.

The *Ecole Militaire Préparatoire d'Infanterie*, at Rambouillet.

The *Prytanée Militaire*, at La Flèche.

under certain conditions to the *Ecole Polytechnique* to complete their special training and scientific education.

The School for non-commissioned officers at Versailles was founded by a Decree of the 10th January, 1884, so that this system of giving commissions may be said to be on its trial.

Vacancies in the Corps of Engineers are given to students from the *Ecole Polytechnique* and to non-commissioned officers in the following proportions :—

To the former in the proportion of the total establishment of the Engineer Staff, *plus* half the establishment of the Engineer Regiments; and to the latter in proportion to the remainder. This is about 4 to 1.

No Sub-Lieutenant can be appointed in the French Army under 18 years of age, and unless he has served two years as *sous-officier*, or studied for two years at the School of St. Cyr or the *Ecole Polytechnique*.

Students from the latter are gazetted to the Engineers in the order in which they pass the final examination at that establishment.

Non-commissioned officers and men of the Army entering the *Ecole Polytechnique* do not count their previous military service towards gaining a commission; if students are sent to the Practical School before they have completed their two years' study at the *Polytechnique*, they are not commissioned till the two years are completed. In the meanwhile, they continue to wear the uniform of the School and are styled *Elèves du Génie*.

No Sub-Lieutenant can be promoted to Second Lieutenant under two years' service in the rank.

Sub-Lieutenants after passing the Practical School are appointed Second Lieutenants in the order in which they are classed by the Examining Board (*Jury d'Examen*). Service in the rank of Second Lieutenant is reckoned from the day they have completed two years' service as Sub-Lieutenant. Those who, in the opinion of the Examining Board, fail in the final examinations, are suspended, and the War Minister decides in each case what employment, if any, they may be given.

Sub-Lieutenants who may be permitted to complete a third year's course of study are only promoted to Second Lieutenant on the completion of their three years' service as Sub-Lieutenant, and rank in order of merit with the batch in which they leave the School.

When Sub-Lieutenants are taken from the School before completing their two years' service in the rank, they serve with the rank of Sub-Lieutenant until they have completed the studies prescribed by the War Minister for the School; these, however, may be dispensed with in war.

Second Lieutenants are promoted to First Lieutenants by seniority.

Sous-officiers appointed to Sub-Lieutenancies must serve two years as Sub-Lieutenants before being promoted to Second Lieutenant.

Except in the case of war, no Lieutenant can be promoted to Captain under two years' service as Lieutenant.

Two-thirds of the promotions to the rank of Captain are given by seniority, and one-third by selection. Promotion from Second to First Captain goes by seniority only.

Except in war, no Captain can be promoted to *Chef de Bataillon*, unless he has served four years as Captain. Half the promotions are made by seniority and half by selection among the First Captains.

No *Chef de Bataillon* can be promoted to Lieutenant-Colonel in peace unless he has served at least three years as *Chef de Bataillon* or Major. Promotion to Lieutenant-Colonel is made by selection only.

Promotion to Colonel is made by selection only, but in peace a Lieutenant-Colonel must have served at least two years in that rank to be selected.

Promotion to Brigadier-General, Divisional General, and Field-Marshal is

made by selection only; but, except in war, no Officer can be promoted unless he has served three years in the rank he holds. Promotion to Brigadier-General is made from Colonels on the active list alone, but to Divisional General from Brigadier-Generals on the active and unemployed lists (*en activité et disponibilité*). Promotion to Field-Marshal cannot, by the Law of the 13th March, 1875, take place without the passing of a special Act for the purpose.

All promotions are made in the name of the President of the French Republic.

Lists for promotion by selection giving the special aptitudes of Officers are annually made out at the General Inspection. These lists are submitted to *Commissions Régionales de Classement* formed of Generals Commanding Army Corps, assisted each by an Inspector-General of Engineers. From these, fresh lists are made out and again submitted to a higher Commission, or *Commission Supérieure de Classement*, formed of Generals Commanding Army Corps, assisted by the President of the Committee on Fortifications. By the latter the Officers for promotion *ou choix* are finally selected and their names submitted, through the War Minister, to the President of the Republic for approval.

Officers and *Adjoints* of Engineers entitled to pensions must retire from the active list at the ages given below :—

Colonels	at 60 years of age.
Lieutenant-Colonels	„ 58 „
<i>Chefs de Bataillon</i>	„ 56 „
Captains	„ 53 „
Lieutenants and Sub-Lieutenants	„ 52 „
Principal <i>Adjoints</i> , 1st and 2nd Class....	„ 60 „
1st and 2nd Class <i>Adjoints</i>	„ 58 „
3rd Class <i>Adjoints</i>	„ 56 „

Engineer Officers may be transferred under certain conditions to the following Departments :—

The Pay and Account Department (*Corps du Contrôle*).
 The Military Intendence.
 The Military Train.
 The Gendarmerie.

Engineer Officers may be admitted by competitive examination to the Staff College or *Ecole Supérieure de Guerre* in the proportion to the other arms fixed by the War Minister. The candidate must not be above the rank of Captain, nor have less than five years' service in the commissioned ranks, during three of which he must have been actually doing duty (*service effectif*). In the case of the Artillery and Engineers one of these years may have been passed in a Training Establishment.

Captains of the Engineer Staff, Captain-Adjutant-Majors of the Engineer Regiments, and Lieutenants and Sub-Lieutenants of the Engineer Train are allowed a riding horse in peace, the property of the public. Captains of the Engineer Train are allowed two horses on the same terms.

In war or in Algeria, Captains of the Engineer Staff and Captains of the Engineer Train would be given two horses each. Captains with companies, Subalterns, and *Adjoints du Génie* would be given one horse each.

By repayment either in one or two instalments, a General of Division may be furnished either in peace or war with 6 horses; a Brigadier-General with 4; a Colonel of the Engineer Staff with 3; a Lieutenant-Colonel in peace with 2, and in war or in Algeria with 3; Colonels and Lieutenant-Colonels of

The *Commission de Télégraphie Militaire*, or Commission on Military Telegraphs.

The *Commission des Substances Explosives*, or Commission on Explosives.

The *Commission Supérieure de l'Artillerie et du Génie*.

The *Commission Mixte d'Examen des Armes et Engins de Guerre*.

They are, however, represented on the following other Committees and Commissions, viz. :—The *Comité de Défense*, the *Conseil Supérieur de la Guerre*, the *Comité Consultatif d'Etat Major*, the *Comité Consultatif de l'Artillerie*, the *Comité Consultatif des Poudres et Salpêtres*, the *Conseil de Perfectionnement de l'Ecole Supérieure de Guerre*, the *Conseil de Perfectionnement de l'Ecole Polytechnique*, the *Commission Supérieure et Consultative des Subsistances Militaires*, the *Commission Supérieure de l'Habillement et du Campement*, the *Commission de Couchage des Troupes*, and the Commission for Administering the Legacy of Marshal Baraguay d'Hilliers.

The Comité Consultatif des Fortifications.

This is also sometimes called the *Comité Consultatif du Génie*. It dates from the year 1776, when it was formed under the name of *Conseil des Fortifications*. The duties and responsibilities are laid down by the Decrees of the 11th March, 1850, and 31st January, 1885.

It is a purely consulting body, and has no executive power whatever. It comprises a President, six Members, and a Secretary. The President is a Divisional General of Engineers, and two of the Members must belong to other arms of the Service—generally Infantry and Artillery. The Members are all General Officers as a rule; the Secretary is a Field Officer of Engineers. Half the total Committee is renewed every year.

The Committee examines and reports upon all matters referred to it by order of the War Minister, but can make no experiments entailing expense without the sanction of the latter.

The Committee applies directly to the War Minister for the presence or assistance of such Officers of Engineers as may appear desirable, and puts itself in communication through the same channel with other Arms and Departments.

The President submits personally every Sunday a weekly report of the doings of the Committee. The Committee presents annually to the War Minister a *résumé* of the reports made by the Inspectors-General of Engineers, of projects for works of defence, &c., and a classification, in order of their importance, of various works proposed for the forthcoming year, but in this the Committee does not touch on the question of expense; this is entirely left to the War Minister himself, who allots the estimates voted according to the reports of the Inspectors-General.

The Committee makes out the distribution of the Officers and *Adjoints* of the Engineers, but in numbers only and not in names. The distribution of the Officers and *Adjoints* themselves, in accordance with the numbers decided on by the Committee, rests with the Bureau for the *personnel* of the fourth (or Engineer) direction of the War Ministry, but before being approved of by the War Minister, is submitted to the Committee for modifications that may appear desirable in the interests of the Service.

The Commission Mixte des Travaux Publics.

This is a mixed Civil, Military, and Naval Commission to enquire into such public works as are proposed, so as to safeguard various public interests, civil, military, or naval.

It is under the Presidency of a *Conseiller d'Etat*. The military element of the Commission comprises two Inspectors-General of Engineers, an Inspector-

General of Artillery, and two Inspectors-General of the other Arms. Including the President, there are fourteen members besides a Secretary. The latter is either a Field Officer of Engineers belonging to the Fortification Dépôt or a Chief Engineer of Public Works.

The Inspectors-General of Engineers belonging to this Commission are generally Members of the Committee on Fortifications.

The Commission Militaire Supérieure des Chemins de Fer.

This was created in 1872. It comprises a President, a Vice-President, nine members, and a Secretary. In 1885, only one member was an Engineer Officer—a Colonel. The Secretary was an Engineer Officer on the General Staff.

The Commission de Télégraphie Militaire.

This was created in 1874. It comprises a President, eleven members, and a Secretary. Two, besides the Secretary, were Engineer Officers in 1885.

The Commission des Substances Explosives.

This was created in 1878. It comprises a President, six members, and a Secretary. Two were Engineer Officers in 1885.

The Commission Supérieure de l'Artillerie et du Génie.

This is a mixed Commission of Artillery and Engineer Officers on purely Artillery and Engineer questions. The numbers, &c., of the Commission are not known.

The total number of Engineer Officers employed at the War Ministry in 1885 was some forty-four of all ranks, besides twelve *Adjoints du Génie* of various classes.

B. BRANCHES AND DEPARTMENTS NOT FORMING PART OF THE WAR MINISTRY.

The Dépôt des Fortifications.

This was created in 1791 under the name of *Archives des Fortifications*, to assist in the work of the Committee (then *Conseil*) on Fortifications. It is a kind of record office where all Engineer plans, projects, drawings, maps, memoirs, &c., are deposited. By a Royal Order of the 27th August, 1830, it was placed immediately under the Committee, the President of the latter acting as Director, and the Secretary as Sub-Director. It comprises, besides these, some ten Officers and seven *Adjoints* of Engineers, and a staff of civilian draughtsmen and clerks, and a civilian Chief Clerk. By an Order of the 11th June, 1878, the Military Ballooning Department (*Service de l'Aérostation Militaire*) now belongs to the Dépôt.

There is a very valuable technical library belonging to the Dépôt. It is in charge of a pensioned Field Officer of Engineers as Librarian.

By a Ministerial decision of the 30th May, 1885, the *Commission des Communications par Voie Aérienne*, or Commission on sending messages by carrier pigeons, optical telegraphy, and the electric light, &c., is placed under the Director of the Fortification Dépôt, the Sub-Director of the same acting as President. There are five members, one is an Artillery Officer, and the remainder Engineer Officers.

The Galerie des Plans Reliefs.

A collection of models of fortified places was commenced in 1660, and at first placed in the Museum of the Louvre. It was transferred to the

Invalides in 1777, where it still remains. It is in the immediate charge of the Director of the Fortification Dépôt under the Committee of Fortifications. The *personnel* comprises a retired Field Officer of Engineers as custodian, three draughtsmen, and two modellers.

The Central Dépôt of Scientific Instruments.

This was created in 1878. Its object is to furnish the Engineers with scientific instruments, either for permanent or temporary use. It is under the Director of the Fortification Dépôt, and is in immediate charge of a pensioned Field Officer of Engineers assisted by an *Adjoint du Génie*.

The Brigade Topographique du Génie (Topographical Brigade).

This was created in 1813. Its present organization is that laid down by a Ministerial Order of January, 1850, since modified by Ministerial Order in February, 1861, and April, 1873. It is a Survey Branch of the Engineers, and until quite recently was under the immediate direction of the Committee on Fortifications, but by a Decree of the 16th May, 1885, it is now, both as regards *personnel* and *matériel*, attached to the General Staff of the War Ministry, and belongs to the *Dépôt de la Guerre, Service Topographique*, or Survey Branch of the General Staff, which in France does the work of the Ordnance Survey of our Service. It is commanded by a Field Officer or Captain of Engineers. Its duties are to make surveys for fortifications and other engineering works. It is organized in a Central Section in Paris, where plans, drawings, &c., are completed, and a variable number of working sections stationed in different parts of the country. In 1885 there were three working sections with headquarters at La Fère, Besançon, and Grenoble. The sections are generally commanded by Captains.

Including the Commandant at Paris, there were 5 Officers, 17 *Adjoints du Génie*, and 9 *Adjoints*, or Probationary *Adjoints*, employed in the Branch altogether in 1885.

The Offices of the Committee on Fortifications, the Mixed Commission on Public Works, and the Fortification Dépôt, are at No. 8, Rue Saint Dominique, Paris.

The *Galerie des Plans Reliefs*, the *Dépôt Central des Instruments de Précision*, and the *Commission des Communications par Voie Aérienne*, are *annexes* or branches of the *Dépôt des Fortifications*.

The Service des Cuirassements (Armour-plate Department).

This was created in 1878, and placed under the Director-General of Engineers of the Paris Government. Its object is to generally prepare designs and plans for armour-plating, and to see contracts for the same carried out. It has to see to the delivery of armour-plates at the works, and to generally superintend all work connected with armour-plated forts and batteries. There were two Officers only employed on it in 1885.

The Office is at No. 39, Rue Belle Chasse, Paris, near the War Ministry.

Etablissements du Génie (Engineer Establishments).

These comprise the *Dépôt des Fortifications* and the *Galerie des Plans Reliefs* already alluded to, the four Schools of Military Engineering for the training of the Engineer Regiments, and the eight District Engineer Commands and thirty-two District Engineer Directions.

The *Dépôt des Fortifications* with its branches or *annexes*, the *Galerie des Plans Reliefs*, the Central Dépôt of Scientific Instruments, the *Commission des*

Communications par voie aérienne, and the Topographical Brigade have already been described. The eight District Engineer Commands and thirty-two District Engineer Directions refer to the permanent territorial duties of the Engineer Staff in peace.

The Eight District Engineer Commands and Thirty-two District Engineer Directions.

According to the Law of the 12th May, 1814, which is still in force, the Engineer Staff undertakes the construction, maintenance, and repair of all fortifications and military works and buildings at home and abroad, in peace or war, the only exception being certain buildings belonging to Artillery establishments, which the Artillery authorities see to themselves.

Thus the French Engineer Staff has much the same kind of departmental work as our "Royal Engineer Department."

These territorial or district duties, generally known as the *Service du Génie*, are organized in 32 Engineer Local Directions. Of these, 32 are in France, 3 in Algeria, and 1 in Tunis. Each Direction is subdivided into from two to eight *Chefferies* or Sub-Directions. The Directions are under "Directors" or *Directeurs du Génie*, and the *Chefferies* under *Chefs du Génie*.

Army Corps Districts Nos. 1, 6, 7, 11, 14, 15, 16, and 18, and the Military Government of Paris, comprise two Directions each. The remaining Army Corps Districts one Direction each only. The 19th Army Corps (Algeria) comprises three Directions.

In Army Corps Districts having one Direction only the Director of the Direction acts as the Commanding Engineer of the District on the Staff of the General Commanding it, with the simple title of *Directeur du Génie de la — Région*.

In Army Corps Districts having two Directions there is a higher Officer as Commanding Engineer of the District—a Brigadier-General—who is given an aide-de-camp—a Captain. He is styled *Commandant du Génie de la — Région*, the appointment being styled *Commandement régional du Génie*.

In the 19th Army Corps District the Commanding Engineer is styled the *Commandant Supérieur du Génie du 19^e Corps d'Armée*. He is given a Chief of the Staff, a Field Officer, and an aide-de-camp—a Captain.

In the Military Government of Paris the Commanding Engineer has many important duties to perform, and is a Divisional General with a Chief of the Staff and an aide-de-camp.

The Director of the Paris Direction of the Military Government of Paris is a Brigadier-General. Other Directors are Colonels, and very rarely Lieutenant-Colonels. The *Chefs du Génie* are Lieutenant-Colonels or *Chefs de Bataillon*, and very rarely Captains.

The Tunis Direction belongs to the army of occupation (*Division d'occupation*). It is under a Lieutenant-Colonel.

Military defences, works, and buildings in Martinique, Guadeloupe, Senegal, Cochin China, and other small French Colonial possessions are in charge of Engineer Officers on the supernumerary list, and serving for the time under the Ministry of Marine.

The following is the present arrangement of the Engineer Directions :—

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Command.	Headquarters.	Engineer Directions.
The Military Government of Paris	Paris	1st Paris 5 <i>chefferies</i> .
1st Army Corps district ..	Lille	2nd Versailles 4
2nd " " " "	Amiens	3rd Lille 6
3rd " " " "	Rouen	4th Arras 5
4th " " " "	Le Mans	5th Amiens 6
5th " " " "	Orleans	6th Rouen 4
6th " " " "	Châlons-sur- Marne	7th Le Mans 3
7th " " " "	Besançon	8th Orleans 5
8th " " " "	Bourges	9th Châlons-sur- Marne ... } 7
9th " " " "	Tours	10th Nancy 8
10th " " " "	Rennes	11th Besançon 4
11th " " " "	Nantes	12th Langres 4
12th " " " "	Limoges	13th Bourges 3
13th " " " "	Clermont	14th Tours 6
14th " " " "	Lyons	15th Rennes 5
15th " " " "	Marseilles	16th Nantes 3
16th " " " "	Montpellier	17th Brest 3
17th " " " "	Toulouse	18th Limoges 3
18th " " " "	Bordeaux	19th Clermont 3
19th Army Corps	Algiers	20th Lyons 2
		21st Grenoble 5
		22nd Marseilles 5
		23rd Toulon 3
		24th Montpellier ... 3
		25th Perpignan 4
		26th Toulouse 2
		26th Bordeaux 3
		28th Bayonne 2
		29th Algiers 7
		30th Oran 6
		31st Constantine ... 6

The Tunis Direction has no number; it comprises 3 *chefferies*.

The total number of Officers employed on district duties comprised in the above Directions, in 1885 were—

1 Divisional General	} As <i>Commandants du Génie</i> .
9 Brigadier-Generals	
1 Brigadier-General	} As <i>Directeurs du Génie</i> .
31 Colonels and Lieutenant-Colonels	
138 Lieutenant-Colonels, <i>Chefs de Bataillon</i> , and Captains	} As <i>Chefs du Génie</i> .
2 <i>Chefs de Bataillon</i>	
10 Captains	As Chiefs of the Staff.
	As Aides-de-Camp.

And some 228 Officers of various ranks above that of First Lieutenant, and 818 *Adjoints du Génie* of various classes.

Besides these there are a good many Officers temporarily attached to the Directions, and many are on command from the Engineer Regiments. The total number employed in various ways by the Directions is not far short of 480 of all ranks.

The total number of Officers belonging to the Expeditionary Force in Tonquin was, according to the "*Etat du Génie*" for 1885 :—

- 1 Colonel in command.
- 1 Lieutenant-Colonel as Chief of the Staff.
- 2 *Chefs de Bataillon*, as Commanding Engineers of the two Divisions.
- 15 Captains.
- 4 First Lieutenants.
- 1 Sub-Lieutenant.
- 8 *Adjoints de Génie* of various classes.

TRAINING ESTABLISHMENTS FOR THE ENGINEERS.

The *Ecole Polytechnique* at Paris is of a civil as well as military nature, and its object has already been sufficiently alluded to (see p. 1195). The Commandant is a Brigadier-General of Artillery or Engineers, and the Second Commandant a Colonel or Lieutenant-Colonel of Engineers or Artillery, alternately.

The Staff comprises—

Six Captains of Artillery and Engineers as Cadet Officers, 10 Examiners, 25 Professors and Instructors, 22 *répétiteurs* and assistant *répétiteurs*, a secretary, an architect, a librarian, a treasurer and assistant treasurer, a storekeeper and assistant storekeeper, a chief clerk, a clerk of works, 3 curators of records, scientific collectors, &c., 2 surgeons, and a dentist.

The *Conseil de Perfectionnement* comprises the Brigadier-General Commandant of the School as President, and 17 members including the Second Commandant.

The majority of the Professors, Instructors, &c., are civilians. In 1886 there were six Engineer Officers employed in the School altogether, including the Second Commandant. Two of these were on the retired list.

The number of students annually admitted is 250. Admission is by open competition. The course lasts two years. The following is the average number of annual appointments made from the School in the various public services.

- From 40 to 50 in the Engineers.
- " 60 to 80 in the Artillery.
- " 2 to 4 in the Corps of Engineers of the Gunpowder Factories.
- " 4 in the Navy.
- " 10 to 20 in the Marine Artillery.
- " 10 in the Corps of Naval Constructors.
- " 1 to 2 in the Corps of Naval Hydrographers.
- " 60 to 80 in the Corps of Engineers of the Public Works Department, Mines, Telegraphs, and various manufacturing branches in the public service, and of certain Railway Companies.

The School is under the Artillery Direction of the War Ministry.

The *Ecole d'application d'Artillerie et du Génie* at Fontainebleau is of a purely military nature, the students being all commissioned Officers. Its object has already been alluded to (see p. 1195).

The Commandant is a Brigadier-General of Artillery or Engineers, and the Second Commandant a Colonel or Lieutenant-Colonel of Engineers or Artillery, alternately.

The Military Staff of the School comprises besides these, 15 *Chefs de Bataillon* (or *Chefs d'Escadron*) and Captains of Artillery or Engineers, two Surgeons, and a Veterinary Surgeon; and the Administrative Staff four retired Officers of Artillery or Engineers as curator, librarian, secretary, treasurer and storekeeper, and one *Adjoint du Génie*, or clerk of works.

The Instructional Staff comprises 31 Professors and Instructors, all Officers of Artillery or Engineers, excepting the Professors and Instructors of German, who may be Officers of the other arms.

The number of Sub-Lieutenants (*Sous-Lieutenant-élèves*) studying at the School in 1885 was 100, and 1 Second Lieutenant on command from the 2nd Regiment, and 1 Sub-Lieutenant from the 1st Regiment.

The subjects taught at the School are : artillery, fortification, construction, applied sciences, mechanics, military art, topography, German, drawing, and riding.

The School is under the Engineer Direction of the War Ministry.

The *Ecole des Sous-Officiers de l'Artillerie et du Génie* at Versailles was created by a Decree of the 10th January, 1884, in connection with the new system of giving Commissions in the Artillery and Engineers to non-commissioned officers of these services. Its object has already been alluded to.

The Commandant is a Colonel of Artillery or Engineers, and the Second Commandant a *Chef de Bataillon* of Engineers or a *Chef d'Escadron* of Engineers, alternately. Besides these, the military Staff comprises a treasurer (a subaltern of Artillery or Engineers), a storekeeper (an *Adjoint du Génie*), and a surgeon.

The Instructional Staff is entirely military. It comprises 11 Professors and Instructors—Captains or subalterns of Artillery or Engineers. In 1885 it included 4 Officers of Engineers.

The *Ecoles Régimentaires du Génie*, or the four Regimental Schools of Military Engineering, are purely Engineer establishments for the training of the Engineer Regiments, and are classed with the *Etablissements du Génie*, or Engineer Establishments (see p. 1214).

They are known as the *Ecoles de Versailles, de Montpellier, d'Arras, and de Grenoble*, where the 1st, 2nd, 3rd, and 4th Regiments of Engineers are respectively quartered.

The instruction and training in these schools is to a great extent done by the Officers of the Regiment, and the Colonels in command are generally responsible for the proper training of their Regiments. Certain matters are, however, more in the hands of the Commandants of the schools, who are Lieutenant-Colonels of the Engineer Staff. These are each assisted by two First Captains belonging either to the Engineer Staff, or detached from their Regiments. There are at each school three civilian Professors of mathematics, drawing, and grammar. These are entirely under the School Commandant. The Staff of each school comprises besides two *Adjoints du Génie* and an *ouvrier d'Etat*.

The school at Versailles is larger than the other three, as the four Railway Companies of the four Regiments of Engineers are attached to it. The Railway Branch of this school has further been lately increased by the conversion of the 20th Battalion of Engineers, formerly belonging to the 3rd Regiment at Arras, into a Railway Battalion. This Battalion is, however, still shown in the "*Etat du Génie*" as a Battalion of *Sapeurs-Mineurs*. There are thus now, nominally at any rate, eight Railway Companies.

The first school comprises, besides the Staff already described, a *Chef de Bataillon* as *Chef du Service des Parcs de Chemins de Fer*, and 1 *Adjoint du Génie*, and 2 *Stagiaires* (or Probationary *Adjoints du Génie*) belonging to the same, besides 2 additional *Adjoints du Génie* and 1 additional *ouvrier d'Etat*, making the total Staff 16 instead of 9.

One of the four schools receives every year in succession a batch of Infantry

Captains to go through a course of field fortification of four weeks in October. For this purpose the Infantry is divided into four groups corresponding with the four schools. About 45 Captains annually attend the course, every Regiment of Infantry or Battalion of Chasseurs sending, as a rule, a Captain every fourth year.

The training of the Engineer Regiments is laid down in the minutest detail in the Regulations of the 25th June, 1885, the main features of which are given further on under the heading of Engineer Troops (see p. 1211).

PART II.—ENGINEER TROOPS.

Peace Organization.

The Engineer Troops of the Standing Army are organized in peace in four Regiments of Engineers (*Régiments du Génie*), or Sappers and Miners (*Sapeurs-Mineurs*), attached to the four Schools of Military Engineering, or *Ecoles Régimentaires du Génie*, at Versailles, Montpellier, Arras, and Grenoble respectively.

Each Regiment consists of 5 battalions of 4 Companies of Sappers and Miners each, 1 dépôt Company, a Railway Company, or *Compagnie d'Ouvriers de Chemins de Fer*, and a Company of Engineer Train, or *Compagnie de Sapeurs Conducteurs*.

The Regiments are numbered 1 to 4 in the order given above, but the 20 Battalions are numbered from 1 to 20, independently of the Regiments and corresponding to the Army Corps they would belong to in war. In peace the five Battalions are stationed with the headquarters of the Regiment, having certain Companies detached, but on mobilization each Battalion would join the Army Corps bearing its number. As there are 19 Army Corps of the Standing Army this left one Battalion, the 20th, over and above in reserve. This Battalion was converted into four Railway Companies by a Ministerial Circular of July, 1884.

The four Railway Companies are attached in peace to the 1st Regiment at Versailles.

In peace certain Companies are detached for service in Algeria and Tunis (at present three), and at present there is a Company serving in Tonquin.

The 1st Regiment at Versailles comprises the 5th, 9th, 10th, 11th, and 20th Battalions; the 2nd Regiment at Montpellier, the 12th, 16th, 17th, 18th, and 19th Battalions; the 3rd at Arras, the 1st, 2nd, 3rd, 4th, and 6th Battalions; and the 4th Regiment at Grenoble, the 7th, 8th, 13th, 14th, and 15th Battalions.

All these Battalions are permanently stationed in peace with the headquarters of the Regiments they belong to, the 1st Battalion having in the beginning of the present year a Company detached at Verdun, the 2nd Battalion a Company at Toul and Commercy, the 3rd Battalion a Company at Epinal, the 5th Battalion a Company at Fontainebleau and a Company at Langres, the 6th Battalion a Company at Longwy, the 7th Battalion a Company at Belfort, the 9th Battalion a Company at the Camp of the *Pas des Lanciers*, the 10th Battalion a Company at Paris and a Company at Besançon, the 12th Battalion a Company at Constantine in Algeria, the 13th Battalion a Company at the Camp of Sathonay and a Company in Tonquin, the 14th Battalion a Company at Briançon, the 15th Battalion a Company at Nice and a Company at Tournoux St. Vincent, the 16th Battalion a Company at Tunis, the 17th Battalion a Company at Algiers, and the 18th Battalion a Company at Oran.

The Regiments of Engineers are exclusively officered from the Corps of Engineer Officers as in our Service, but all Officers below the rank of Second Captain are shown as belonging to the Regiments, except the Sub-Lieutenants studying at the *Ecole d'Application*; these are shown as belonging to the Engineer Staff.

The total number of Officers belonging to the Regiments fixed by Law has been given at p. 1192.

The Staff of a Regiment comprises—

- 1 Colonel in command.
- 1 Lieutenant-Colonel.
- 5 *Chefs de Bataillon* to command Battalions.
- 1 Major.¹
- 1 Paymaster (a Captain).
- 1 Assistant-Paymaster (a Subaltern).
- 1 Clothing Officer (a Captain).
- 1 Ensign (a 2nd Lieutenant or Sub-Lieutenant).
- 2 Surgeons.
- 1 Veterinary Surgeon.
- 1 Bandmaster.²

The non-commissioned staff, or *pétit état major* and *peloton hors rang*, comprises—

- 5 Adjutants (*Sous-Officiers*).
- 45 Bandsmen and bugiers.
- 3 Sergeant-majors.
- 3 Sergeants.
- 1 Quartermaster-corporal.
- 7 Corporals.
- 15 Sappers.

Total, 79 non-commissioned officers and men, making the total Staff of a Regiment, 16 Officers, 79 non-commissioned officers and men, with 16 riding horses.

An Engineer Regiment has a colour and a band.³ These remain at home on mobilization.

The establishment of a Company of Sappers and Miners in peace is—

- 1 First Captain (*Capitaine Commandant*).
- 1 Second Captain (*Capitaine en Second*).
- 1 First Lieutenant.
- 1 Second Lieutenant or Sub-Lieutenant.
- 28 Non-commissioned officers.
- 80 Sappers.

Or a total of 4 Officers and 108 non-commissioned officers and men.

The establishment of a Railway Company is the same, except that a Captain may be substituted for one of the subalterns, and the number of sappers is 100.

The establishment of a Company of Engineer Train comprises 4 Officers

¹ There is no rank of Major in the French Army. There is a "Major" to every regiment; it is an appointment, or *emploi*. The Major of a French regiment is either a Captain or *Chef de Bataillon*, and his duties are purely administrative.

² The bandmaster, or *chef de musique*, is a commissioned Officer in the French Service.

³ The band of the 1st Regiment is one of the best in the French Army. Many of our readers may have heard it perform at the "Healtheries" in 1884.

(the same as in a Company of Sappers and Miners), 36 non-commissioned officers, 80 drivers, and 120 horses.

A *Depôt* Company has the same establishment as a Company of Sappers and Miners, except that there is no Second Captain.

The total establishment of a Regiment is then—

9 Field Officers.
98 Officers.
731 Non-commissioned officers.
1,860 Sappers and drivers.

Or 107 Officers and 2,591 non-commissioned officers and men.

The four Regiments number therefore—

428 Officers.
10,364 Non-commissioned officers and men.

Or 10,792 of all ranks.

The *Effectif Budgétaire* of the Engineers is laid down as 914 Officers and 10,502 non-commissioned officers and men.

According to the Army List of 1885 the 1st Regiment had 100 Officers, the 2nd Regiment 99, the 3rd Regiment 104, the 4th Regiment 95, and the 4 Railway Companies 13 Officers only of all ranks, giving a total of 411 Officers of all ranks, or 17 below the total establishment.

Again, some 70 Officers are detached or on command, so that the total number of doing-duty Officers is about 87 below what it should be.

The 1st Regiment had in 1885 a list of 11 Lieutenants and 17 Sub-Lieutenants in the Reserve, the 2nd Regiment 8 Lieutenants and 21 Sub-Lieutenants in the Reserve, the 3rd Regiment 5 Lieutenants and 21 Sub-Lieutenants in the Reserve, and the 4th Regiment 8 Lieutenants and 21 Sub-Lieutenants in the Reserve.

The 4 Railway Companies had 1 Captain and 9 Sub-Lieutenants in the Reserve.

Recruiting.

The 4 Regiments of Engineers of the Standing Army, *minus* the 20th Battalion and the 4 Railway Companies, receive annually 2,007 recruits from the first portion of the annual contingent, and 720 enlisted men for 5 years' nominal training, giving 502 of the former and 180 of the latter per Regiment.

The total number of men annually enrolled for 5 years' training is then 2,727 altogether. The training as a matter of fact, however, is only a little over 3 years. This gives, deducting casualties—

Army of the 1st Line—

With the colours	4 contingents nominally, or	10,268 men
<i>En disponibilité</i>	1 " "	2,413 "
Reserve	..... 4 " "	9,161 "
	Total	21,842 "

Army of the 2nd Line—

Territorial Army	5 contingents, or	10,465 men
Reserve of do.	6 " "	11,232 "
	Total	21,697 "

Besides the above, a certain number of men are annually taken for a service of 12 months only. 612 of such men are taken by the Engineers. This gives, deducting casualties—

Army of the 1st Line—

With the colours	1	contingent, or	612	men
<i>En disponibilité</i>	4	"	2,214	"
Reserve	4	"	2,034	"
			Total	4,860 "

Army of the 2nd Line—

Territorial Army	5	contingents, or	2,322	men
Reserve of do.	6	"	2,496	"
			Total	4,818 "

Territorial Battalions.

Each Army Corps District furnishes a Territorial Battalion of Engineers bearing its number. The Companies vary in number, the numbers being fixed from time to time by the War Minister.

At the beginning of the present year there were 9 Companies in the 1st Battalion, 4 in the 2nd, 4 in the 3rd, 3 in the 4th, 3 in the 5th, 5 in the 6th, 3 in the 7th, 2 in the 8th, 2 in the 9th, 2 in the 10th, 2 in the 11th, 3 in the 12th, 5 in the 13th, 3 in the 14th, 5 in the 15th, 4 in the 16th, 3 in the 17th, and 4 Companies in the 18th Battalion, giving a total of 66 Companies.

A Battalion is commanded by a *Chef de Bataillon*, but there are no Battalion Staffs in peace.

The total number of Company Officers given in the *Etat du Génie* for 1885 was—

62 Captains
51 Lieutenants (First and Second).
50 Sub-Lieutenants.

Total 163 or an average of 2.48 Officers per Company.

There are 4 Territorial Depôts for these Battalions stationed at the four Schools of Military Engineering.

They comprise each a Major—a *Chef de Bataillon* of the Territorial Army—and two Sub-Lieutenants of the same—Acting Paymaster and Clothing Officer respectively.

To recapitulate :—

Trained Men—

Standing Army and Reserve	21,842	men
Territorial " "	21,697	"
		43,539 "

Partially Trained Men—

Standing Army and Reserve	4,860	"
Territorial " "	4,816	"
		9,676 "

Total more or less trained Engineer Troops in Active and Territorial Armies, 53,215.

A certain number of men are annually excused serving with the colours in peace-time. Of these, 1,200 are detailed for the Engineers. The 20 contingents of such men would give, deducting casualties, some 19,358 men. As they receive no military training whatever, they may be neglected.

The Railway Companies are not included in the above.

Of the annual contingent taken for 5 years, 176 are taken for these Companies, and to these should be added 96 enlisted men, giving a total of 272 recruits each year for the 8 Companies that now exist.

The Railway Companies do not take any men of the second portion of the contingent.

The Engineers are recruited throughout France, every Sub-district having to furnish a certain number of men of the first portion of the contingent, and a certain number of Sub-districts, men of the second portion. In the latter case, the Sub-districts are always comparatively near the headquarters of the Regiment the recruits are to be sent to. In the former case this is by no means the case, the men being taken throughout the length and breadth of the country.

Thus the 1st Regiment at Versailles draws its recruits of the first portion from 33 Sub-districts scattered throughout the country, from Arras in the north to Montpellier in the south, and Brest in the west to Grenoble in the east. The same Regiment draws the recruits of the second portion from 14 Sub-districts, situated chiefly in the north-western part of France. The 2nd Regiment draws its recruits of the first portion from 33 Sub-districts throughout the country, and the recruits of the second portion from 25 Sub-districts chiefly in the south-western part of France. The 3rd Regiment draws its first portion from 43 Sub-districts throughout the country, and its second portion from 18 Sub-districts chiefly in the north of France. The 4th Regiment draws its first portion from 40 Sub-districts throughout France and Corsica, and its second portion from 22 Sub-districts chiefly in the eastern and south-eastern part of France. The newly-made Battalion of Railway Companies, formerly the 20th Battalion of Engineers, draws its recruits from 33 Sub-districts.

The 1st Railway Company draws its recruits from 12 Sub-districts, the 2nd from 13, the 3rd from 10, and the 4th from 13 Sub-districts scattered throughout France from north to south and east to west.

The proportion of men of various trades to be selected from the annual contingent of recruits for the Regiment of Engineers are as follows :—

	For the 1st Regiment.	For the 2nd Regiment.	For the 3rd Regiment.	For the 4th Regiment.
Of carpenters, joiners, &c.	$\frac{3}{30}$ ths	$\frac{4}{30}$ ths	$\frac{4}{30}$ ths	$\frac{4}{30}$ ths
Of bricklayers and stonemasons ..	$\frac{2}{30}$ ths	$\frac{1}{30}$ th	$\frac{2}{30}$ ths	$\frac{1}{30}$ th
Of fitters, locksmiths, &c.....	$\frac{1}{30}$ th	$\frac{1}{30}$ th	$\frac{1}{30}$ th	$\frac{1}{30}$ th
Of blacksmiths, &c.	$\frac{1}{30}$ ths	$\frac{2}{30}$ ths	$\frac{2}{30}$ ths	$\frac{3}{30}$ ths
Of saddlers, harness-makers, and shoeing smiths	$\frac{1}{30}$ th	$\frac{1}{30}$ th	$\frac{1}{30}$ th	$\frac{1}{30}$ th
Of drivers and carters	$\frac{1}{30}$ ths	$\frac{1}{30}$ ths	$\frac{1}{30}$ ths	$\frac{1}{30}$ ths
Of navvies, miners, and quarrymen	$\frac{1}{30}$ ths	$\frac{1}{30}$ ths	$\frac{1}{30}$ ths	$\frac{1}{30}$ ths
Of various trades such as tin- smiths, ropemakers, basket- makers, shoemakers, boatmen, caulkers, mathematical instru- ment makers, draughtsmen, en- gravers, lithographers, photo- graphers, telegraphists, book- binders, painters, &c.....	$\frac{2}{30}$ ths	$\frac{2}{30}$ ths	$\frac{1}{30}$ th	$\frac{1}{30}$ th

Besides these, young men employed in the Six Great Railways Companies and the State Railways are also selected, according to instructions of the War Ministry, for the Engineer Regiments, and certain young men belonging to carrier pigeon clubs are also set aside for the 1st Regiment at Versailles.

Recruits for the 20th Battalion and the four Railway Companies are not taken from Railway servants, but from tradesmen, &c., likely to make good Railway Sappers, if we may use the term.

The minimum standard for the Engineers and Railway Companies is 1·66 metres, or 5 feet 5·3 inches. There is no maximum standard, as in the Cavalry. Shoeing smiths and collarmakers may be taken at 1·54 metres, or 5 feet 0·6 inches, and armourers, tailors, and shoemakers at 1·62 metres, or 5 feet 3·7 inches.

Recruits belonging to carrier pigeon clubs may, if very desirable men, be taken at 2 or 3 centimetres below the minimum standard, or at 5 feet 4·5 inches or 5 feet 4·1 inches respectively.

TRAINING.

According to the Regulations of the 25th June, 1885, the training of Engineer Regiments is intended to give Officers, non-commissioned officers, and men such special theoretical and practical training as may fit them for the various ranks they hold, as well as in each case for the rank next above.

The instruction is divided into *general or regimental training* and *special or technical training*.

The Colonel in command has general superintendence of the training of his Regiment. He is held responsible that all regulations are properly attended to; he personally attends all instruction, both theoretical and practical, so far as his other duties permit him, and he is supposed to use all his influence to encourage among Officers and men a desire for work and study, and to promote their physical and intellectual welfare.

General or Regimental Training (Instruction Générale ou de Régiment).

The Infantry training regulations apply equally to the Engineers with the exception of the Companies of Engineer Train, and are only slightly modified by certain regulations which apply to the Engineers only.

The Lieutenant-Colonel has special charge of all regimental training in detail, and he gives his instructions and orders to the Officers and non-commissioned officers employed as instructors. His duties and functions are in fact precisely analogous to those of a Lieutenant-Colonel of an Infantry Regiment, as laid down by the Regulations for the regimental duties of the Infantry (*Décret sur le Service intérieur des Troupes d'Infanterie*). These and other regulations give in detail the duties that have to be undertaken by Field Officers, Captains, Subalterns, and non-commissioned officers.

Theoretical Instruction.—The theoretical training of a Regiment is given in the following:—

1. The Decree on regimental duties in Infantry Regiments.
2. The Regulations on the manoeuvres of Infantry.
3. The Decree on garrison duties (*service des places*).
4. The Decree on the field duties and practical training of Infantry in the field.
5. The Regulations on the care of arms.
6. The Musketry Instructor's manual.
7. The Regulations for the transport of troops by rail.
8. The Regulations on the method of carrying kits and field equipment.
9. The Regulations on the supply service, so far as the regimental authorities are concerned.

10. The Military Penal Code.

The *Chefs de Bataillon* see that their Officers are constantly practised in the theory of Squad, Company, and Battalion drill, and satisfy themselves as to their proficiency by simple verbal examinations, dealing only very casually with Squad drill.

The Lieutenant-Colonel gives instruction in the theory of Brigade drill. This is not obligatory on Lieutenants and Sub-Lieutenants.

Captains and Subalterns who have constantly attended these classes for two consecutive years may, if they are considered sufficiently proficient, be dismissed further instruction.

Theoretical instruction in drill in close formation (*ordre serré*) is given by the Adjutant-Major of the Battalion to non-commissioned officers and men qualifying for promotion. Besides the Adjutant, who more especially instructs the corporals, the Adjutant-Major has an Officer as an assistant to instruct men qualifying for the stripe. The theoretical instruction in drill in extended order (*ordre dispersé*) of non-commissioned officers and soldiers is left to Captains of Companies.

Theoretical instruction in regimental, garrison, and field duties, and the transport of troops by rail, is given to the Officers by the *Chefs de Bataillon*, to the *sous-officiers* by Lieutenants of Companies under the supervision of the Captains, and to corporals and sappers by the *sous-officiers* under the supervision of the Company Officers.

A class for theoretical instruction in musketry and the care of arms is annually formed in a Regiment. The instruction comprises a perfect knowledge of the Musketry Instructor's manual, a thorough acquaintance with the Regulations of the 1st March, 1884, on the care of arms, and the theory and practice of judging distances. Lectures are given on these subjects to Lieutenants and Sub-Lieutenants by the Captain-Musketry-Instructor (*Capitaine de Tir*), and to *sous-officiers* and corporals by the Musketry Instructors (*Officiers de Tir*). The theory of musketry is also explained in the barrack-rooms to the men by the *sous-officiers* of Companies, under the supervision of the Company Officers.

The stowing of kits and the methods of carrying the field equipment are explained to corporals and sappers in the barrack-rooms, under the supervision of Lieutenants of Companies.

Captains and Lieutenants are instructed in the theory of military administration, so far as it applies to the regimental authorities, by the Major. Non-commissioned officers are instructed in the same by the Paymaster (*Trésorier*) or his assistant (*Adjoint*).

Military Penal Legislation forms a subject for lectures given by the Major or a *Chef de Bataillon* to Captains and Subalterns.

All the above theoretical instruction is carried on as a rule in winter, except in the subject of the transport of troops by rail, lectures on which are given each year immediately before the practical instruction of entraining and detraining takes place. Besides, when exercises in Infantry drill and manœuvres are stopped by bad weather, the Colonel may order lectures or theoretical instruction on the same to take place instead, indoors.

Special instructional cadres are formed for the theoretical instruction in the subjects above enumerated of Officers and men of the Reserve and Territorial Army, when they are called out.

The number of lectures proposed for the year, with the days, hours, time to be devoted to each subject, &c., is annually filled in by the Colonel on a printed form, and submitted to the Inspector-General.

Independently of this, however, special lectures may be given to Officers to make up for lost time.

Practical Instruction.—The practical training of a Regiment comprises—

1. Infantry drill and manœuvres.
2. Practical instruction of the cadres.
3. Field duties.
4. Target practice.
5. Marches and encampments.
6. Entraining and detraining.
7. Fencing, gymnastics, swimming, and riding.

Recruit drill takes place twice a day, but in the interval, instruction is given in the barrack-room on various Service rules and regulations.

Officers and non-commissioned officers detailed to instruct recruits are changed as often as it may be necessary, partly to increase the number of qualified instructors, and partly to enable them to attend to their own training. Recruit drill is carried on precisely as in the Infantry.

Squad and Company drill in close formation takes place annually for the whole Regiment, beginning, if the weather permits, on the 1st March. This is afterwards followed by Squad and Company drill in extended formation, and next by Battalion drill in close formation until a certain proficiency is acquired. The Battalions are also exercised on a few occasions in the open formation, so as to enable Officers and men to be familiar with the attack formation and combined action of the various échelons.

When Battalions have acquired a certain steadiness in Battalion drill, they are drilled by Captains; this also gives the Lieutenants the opportunity of acting as Captains and Adjutant-Major.

Brigade drill is sufficiently practised to enable Officers and men to be familiar with the movements of large bodies of troops, more especially for purposes of reviews and marching past.

The mornings of Wednesdays and Fridays are devoted to exercises in field duties.

Target practice may begin as soon as the Companies have done sufficient preliminary drill. It is always preceded by the *tir à tube*, or what is known at present in this country as practice with the Morris tube, carried out in the barrack-rooms and barrack-square.

The practical instruction of the cadres is carried out in accordance with the Ministerial Circular of the 15th December, 1876, but, of course, more especially in accordance with such portions as refer to the Engineers, special stress being laid on the taking up of positions.

All drills and exercises last two hours, exclusive of periods of standing easy, and the time taken in marching to and from the ground.

Certain forenoons of Wednesdays and Saturdays are devoted to practice in marching and encamping. The marches are made to apply as far as possible to the duties of the Engineers in the field, and are determined on, both as regards number and object, by the Inspectors-General. Encamping comprises bivouacking, pitching and striking tents, making kitchens, latrines, shelters, drains, &c. In all exercises in marching and encamping, non-commissioned officers and men always carry the field equipment they would on service.

Practice in entraining and detraining takes place every year at such times and places as are fixed by superior authority.

Fencing, gymnastics, and swimming are carried on as in the Infantry, fireman's duty being in addition taught as part of the gymnastic instruction.

Instruction in riding is given to such Lieutenants and Sub-Lieutenants as have not passed the *École d'Application*, by the Officers of the Company of Engineer Train with the horses belonging to the same.

Officers and men of the Reserve are given the same training in principle as the Engineers of the Active Army, only depending on the periods for which they are called out, determined on by the War Minister. Similarly

the Companies of the Territorial Army receive a like training, the Regiments of the Active Army furnishing the necessary instructional staffs.

Special Squads for Non-commissioned Officers.

These are special Squads (*pelotons d'instruction*) for soldier-candidates for the stripe (*candidats caporaux*), and corporal-candidates for the rank of *sous-officier* (*candidats sous-officiers*).

In the former, selected men are at once taken from the annual contingent and formed in a special squad in each Regiment, the number being fixed by the Colonel, and the candidates recommended by the Captains of Companies. A special Instructional Staff, struck off all other duties, is attached to the squad.

Volunteers and young men enlisting before the time of their liability to service are placed in the squad on joining, forming a special class by themselves. Young soldiers of the annual contingent may also, if they can read and write and know the first four rules of arithmetic, and are otherwise desirable men, be allowed to join this class after its formation.

The instruction begins as soon as the class is formed, and lasts till the *exercices de détail* commence.

After the *exercices de détail* are over, a special squad of corporal-candidates for the rank of *sous-officier* is formed in each Regiment. The numbers are fixed by the Colonel and based on the vacancies which are likely to occur at the end of the year. The candidates must be recommended by the Captains of Companies, but some may, as an exceptional rule, be selected from the special squad of candidates for corporals. The Instructional Staff is a special one, and is struck off all other duties. The squad is broken up on the 15th September of each year at the latest.

Both soldier-candidates (*élèves caporaux*) and corporal-candidates (*élèves sous-officiers*) live with their respective Companies; this rule being only modified under special circumstances. They are at the disposal of the Captains of their respective Companies when not actually under instruction. They take their share of garrison duties, being detailed for these by the Colonel so as not to interfere with their instruction. They are available as instructors to the Reserves, and take part in the annual autumn manœuvres.

Before a squad is broken up, the members are examined by a Board of Officers under the presidency of a *Chef de Bataillon*, detailed by the Colonel. The examination is a verbal one. The results are entered in the man's pocket ledger (*livret individuel*), together with the dates of joining and leaving the squad, &c., but no classification takes place in consequence.

Men may be dismissed the squad by the Colonel for misconduct or incapacity, on the recommendation of the Captains of Companies or the report of the squad instructors through the Lieutenant-Colonel.

Special or Technical Training (Instruction Spéciale ou d'Ecole).

There is a School of Military Engineering (*Ecole Régimentaire du Génie*) in each of the garrisons where there is a Regiment of Engineers (Versailles, Montpellier, Arras, and Grenoble).

Instructional Staff.—The Colonel is Director of the School, and, like a *Directeur du Génie*, is responsible for the expenditure of public money, and corresponds in such matters directly with the War Ministry.

A *Chef de Bataillon* of the Engineer Staff, with the title of "School Commandant," has administrative charge of the School and superintends all technical and practical instruction, except in such subjects as form part of the

regimental instruction, which is left to the *Chefs de Bataillon* under the Lieutenant-Colonel.

The School Commandant has charge of all stores, as well as the care and custody of the Engineer Parks attached to the school.

Two Officers of the Engineer Staff of the rank of Captain are attached (*Adjoints*) to the School Commandant as assistants; one at least of these must be a First Captain.

There are three civil professors in each school, one teaching grammar, history, and geography; another drawing, topography, and surveying; and a third mathematics and physics. They are under the immediate orders of the School Commandant.

There are two *Adjoints du Génie* (or Clerks of Works) under the immediate orders of the School Commandant. One has charge of all stores required for practical instruction and the Engineer Parks, and the keeping of the books and ledgers connected therewith (*comptabilité matières*). The other is employed chiefly in office work; he has charge of the library and model-room, and all furniture, &c., belonging to the school-rooms, and generally all stores required for theoretical instruction. He has charge of all accounts (*comptabilité finances*), and acts as treasurer in all school expenses. The former is assisted by an *Ouvrier d'Etat* or Foreman of Works.

The Lieutenant-Colonel, the *Chef de Bataillon*, and the other Officers of the Regiment, take a share in school instruction as laid down by the present regulations, and non-commissioned officers and men are detailed to assist the professors and *Adjoints du Génie* as circumstances require. On the application of the School Commandant such men may be more or less struck off guard-duty and duties for the week, by the Colonel, should he think it necessary.

Buildings, &c.—Every school is properly provided with the necessary buildings for technical instruction, such as class rooms and lecture theatres, a library, map and plan rooms, model and instrument rooms, a laboratory, &c.

There are also workshops for repairing the *matériel* and stores used for instructional purposes, making certain tools and appliances, and generally keeping the Engineer Parks in order.

The stores used for instructional purposes and those belonging to the Engineer Parks are kept distinct and in separate buildings.

In the winter two class rooms are lighted and warmed for voluntary study in the evening, one for *sous-officiers* and the other for corporals and sappers.

The library is open during certain hours to Officers, *Adjoints du Génie*, and Professors. Attached to it are reading and writing rooms. A third room should, when it is possible, be set apart for *sous-officiers*. A *sous-officier* of the Regiment is detailed by the Colonel as assistant librarian.

The model and instrument rooms contain sets of engineering instruments and appliances, and models illustrating details of fortification and other engineering works, the attack and defence of fortresses, railways, masonry brickwork, carpentry, &c.

Practice Grounds.—Every School of Military Engineering has a certain space of ground (*polygone*) for practical instruction in field works, &c. These *polygones* are exclusively for the use of the Engineers, and no other troops can use them without a formal order of the War Minister.

Every School has sets of surveying and levelling instruments, signalling apparatus, tools for sappers, miners, masons, carpenters, &c., mining frames and sheeting, timber for field works, bridging, shelters, &c., gabions, fascines, rails, and sleepers, and every other kind of store necessary for practical instruction. All these stores are exclusively employed for instruction, and both Colonel and School Commandant are responsible for this, and that they are not needlessly expended. The care, issue, &c., of these stores are laid

down in the Store Regulations for the Engineers (*Règlements sur la comptabilité-matières en vigueur dans le service du Génie*).

Theoretical Instruction.—This comprises —

1. The French language.
2. Mathematics and Physics.
3. Drawing.
4. Fortification and Military Engineering.
5. Geography.
6. French History.

Instruction for non-commissioned officers and men is divided into an elementary course comprising a certain number of classes given in the barrack rooms under the supervision of the Company Officers, and in secondary and superior courses, divided each into two divisions, given in the class rooms.

The number of attendances at each course, and the detail of Officers, Professors, and monitors to the latter, are annually fixed. Non-commissioned officers are detailed as monitors by the Colonel. The Officers are annually detailed as instructors by the Inspector-General on the recommendation of the Colonel.

Separate theoretical instruction in field fortification, siege works, bridging, and railways is given to *candidats sous-officiers* by the Company Officers, and to corporals and men qualifying for promotion, by the Company *sous-officiers*. This is under the supervision of the *Chefs de Bataillon*.

The above courses are obligatory on all non-commissioned officers and men, the classes being formed, without distinction of rank, of members possessing instruction of approximately the same degree.

Non-commissioned officers and men are annually divided into two categories by an examination held on the approach of the winter months. The first category comprises candidates for commissions, forming an advanced class; candidates for *Adjoints du Génie* or Clerks of Works, forming a second class; and *sous-officiers* and corporals candidates for promotion, a third class. The second category comprises men who do not aspire to promotion, or who are not considered sufficiently instructed for the rank they hold. They may, if they wish, be admitted to the third class just alluded to.

Theoretical instruction is, as a rule, carried on in winter, beginning on the 1st November and ending on the 1st March, but may take place when out-of-door work is interrupted by bad weather. Theoretical instruction in practical subjects should precede practical instruction in the same, independently of the time of year.

In the winter months theoretical instruction takes place every morning on week days.

The classes are annually arranged by the Colonel and submitted to the Inspector-General, showing the hours of attendance, &c., drawn up so as not to interfere with the ordinary duties of the Superintending Officers. Rules and regulations for dress, discipline, and other minor matters are left to the Colonel.

Professors and Officers make out returns on printed forms of all men that have passed through their hands. These returns, with the reports on the progress, intelligence, &c., of the men whose instruction they have supervised, are forwarded to the Colonel and by him eventually to the Inspector-General.

The *Chefs de Bataillon* make out returns in a similar manner of the men that have been practically instructed under their supervision.

No returns are made out for elementary instruction.

Finally the Colonel makes out a general return of all instruction given in the School and forwards it to the Inspector-General, and in addition a return

is made out for each man in which are entered the remarks of Captains of Companies concerning military duties and the instruction left to them.

At the end of the winter season an examination in school instruction takes place in the presence of the Colonel or Lieutenant-Colonel. The men are individually and verbally examined.

Theoretical Instruction of Officers.—The Officers of a regiment have annually to go through a course of theoretical mining and the attack and defence of places, under the School Commandant. Officers of known ability may be excused this, but the circumstance must be reported to the Inspector-General.

Encouragement is given by the Colonel to meetings for the discussion of professional subjects.

Lieutenants have annually to put together the notes, sketches, &c., they have made in the military reconnaissances which form part of their practical special training, to form a work of a topographical character. Officers of known ability may, however, be excused this by the Colonel.

Captains and Lieutenants have annually to investigate and treat certain professional questions or translate articles of professional interest in foreign languages, adding their own notes and observations. The subjects, &c., are given out by the Colonel.

The memoirs, essays, &c., written by Officers, are examined by the School Commandant, who submits them with his remarks (on a separate sheet of paper) to the Colonel. The latter again submits them to the Inspector-General, with his own and the School Commandant's remarks, calling attention to proof of ability or the reverse, as the case may be. Finally the Inspector-General calls the attention of the War Minister to such work as gives proof of undoubted ability.

Practical Instruction.—This is divided into five classes, viz. :—

1. Field Fortifications.
2. Sapping.
3. Mining.
4. Bridging.
5. Railways.

All men of the Regiment are put through these classes without distinction, but there are in addition the following classes reserved for special men only. These are—

6. Classification and packing of tools and stores.
7. Loading and unloading wagons and pack animals.
8. Pyrotechny.
9. Surveying.
10. Signalling.

Field fortification, sapping, and mining are followed by siege operations, above and below ground, and works to illustrate the attack and defence of positions in the fields. Every step is explained, the object of every work illustrated, and journals accompanied by the necessary drawings kept, as in actual warfare.

No other method of instruction than that laid down by Regulation (*Règlement sur l'Instruction des Régiments du Génie*, 25th June, 1885) is to be used under any circumstances, nor is instruction ever to be made the subject of experiment. Experiments are carried on separately, and are not to interfere with class instruction.

Instruction in the first five subjects above mentioned is carried on under the immediate supervision of Captains of Companies under the direction of the *Chefs de Bataillon*. All work is done by Companies, so that the men of

the Company work all together at the same kind of work under their own Officers and non-commissioned officers. All the Companies of a Battalion are put through the same class simultaneously.

There must be always present at least one of the Lieutenants per Company. The Captain is responsible that the instruction is properly carried out. The Second Captain acts as his assistant, but is in addition directly held responsible for tools and stores issued by the School of Military Engineering. The Officers belonging to the latter have again to see for themselves that these tools and stores are not unnecessarily expended or misapplied, and for this purpose visit the works as often as they may consider necessary.

Instruction in the classification and packing of tools and stores, and the loading and unloading of wagons and pack animals, is given to all non-commissioned officers, *maitres-ouvriers* (foremen-artificers), and soldier-candidates for the stripe, of the Regiment, by the Company Officers under the supervision of the Lieutenant-Colonel.

Instruction in pyrotechny is given to a certain number of selected men per Regiment. A *maitre-ouvrier*, chosen as a man having a turn for this kind of craft, is selected from each Company to undergo instruction. A *sous-officier* styled *Chef Artificier* acts as instructor to the class, which is under the supervision of one of the Captains-Adjoints of the School. The *Chefs Artificiers* are obtained by sending twice a year two corporals or young *sous-officiers* selected by the Colonel to the Central School of Pyrotechny at Bourges. In every Company all non-commissioned officers, and such sappers as are candidates for the stripe, receive from the Company Officers, whilst undergoing instruction in mining, a certain amount of training in the use of explosives, more especially as regards the firing of mines, &c.

Preliminary instruction in pyrotechny is given to Lieutenants and Sub-Lieutenants by the Captain-Adjoint already referred to.

The Surveying class is gone through by all the *sous-officiers* of the Regiment and such corporals as appear to have an aptitude for surveying. They are divided into Sections or "Brigades" according to their degree of knowledge. The instruction is carried on by the Professor of Surveying, who takes his orders direct from the School Commandant.

Practical instruction in surveying is arranged by direction of the Colonel so as not to interfere with other instruction.

Instruction in Signalling is given to a certain number of selected non-commissioned officers and men per Company. The Signalling class is under one of the Captains-Adjoints, who may be assisted by a Lieutenant and a staff of instructors. The hours of instruction are adjusted so as not to interfere with the practical training of the entire Company.

Siege Operations.—Siege operations take place annually, the whole Regiment taking part in them. They consist of the usual works connected with an attack *en règle* against a front of fortification, the nearer works of approach being executed whilst the further ones are traced only.

Certain Officers have also, in addition to this, to draw up projects for attack either on the place where the Regiment is quartered, or other places annually indicated by the War Minister.

Mining operations are annually carried out by groups of two Regiments, the Regiment at Versailles exercising every other year with the Regiment at Arras, and the Regiment at Montpellier every other year with the Regiment at Grenoble. When a Regiment is prevented from taking its turn in any given year, it makes up lost time by performing the exercises in the next two consecutive years, so as not to disturb the order of rotation. All Officers of the Regiment take part in these exercises, and a certain number of the Officers of the Regiments not exercising in the year are detailed to attend the exercises of the other Regiments.

Besides regular siege operations, the Regiment is exercised, as a whole, in hasty entrenchments and the attack and defence of positions in the field, both on its exercising ground and in the country in the vicinity, so far as it is possible.

Projects for the exercises in which the Regiment takes part as a whole are drawn up beforehand by the School Commandant and Lieutenant-Colonel, under the direction of the Colonel. The latter details both the Officers of the School and Regiment to certain special duties, and himself superintends the execution of the projects, the School Commandant acting as his Staff Officer.

Siege operations both above and below ground are accompanied by elaborate journals of operations, plans, and drawings drawn up by the Officers commanding the attack and defence.

The preliminary work of these exercises forms a subject of study, as a rule under a Field Officer of the Regiment. The report and proceedings are forwarded to the War Minister with the Colonel's remarks.

Practical instruction is carried on for the greater part in the summer season commencing 1st April, but it continues nevertheless during the winter months, weather permitting, for such men as are not under class instruction indoors. Work goes on every day in the week except Saturday, the spells lasting from three to four hours each. There are two such spells a day, except on Wednesday forenoon. The forenoons of Wednesdays and Saturdays are devoted to military drills and exercises.

Siege operations above ground take place night and day, the men working in reliefs as on service, but mining operations, as a rule, by day only.

Working parades are under the Lieutenant-Colonel. The Companies are marched to and from work by the Company Officers.

A programme for practical instruction during the summer is annually submitted by the Colonel to the Inspector-General. The number of attendances at each class is fixed as a maximum. The Lieutenant-Colonel submits every Saturday to the Colonel a detail for the work in the ensuing week, showing the distribution of the Companies, &c. This detail is afterwards made known to all the Officers of the Regiment.

Companies receive their tools and stores from the *Adjoint du Génie* in charge of stores. A general inventory of all stores takes place once a year. Every Company is responsible for the stores issued to it, and the losses that cannot be satisfactorily accounted for must be made good by it.

Distribution lists, showing the work done, the number of men present, &c., are kept by Lieutenants of Companies. These lists are examined by the Captains of Companies at the end of every week and submitted, with their remarks, to the Colonel. The Lieutenant on duty for the week makes out another special return or list. The Second Captain makes from the Lieutenants' lists a weekly return showing the work done by the Company, and finally, on completing each class of instruction, a general return is made from these and submitted to the *Chef de Bataillon*.

These journals and returns all eventually find their way through the Colonel to the Inspector-General.

A similar procedure is observed by the Professor of Surveying and the Officers Instructors of Pyrotechny, Signalling, &c.

Entries are made in the pocket ledgers of non-commissioned officers and men by Captains of Companies and the School Commandant, showing their degrees of instruction in every branch.

Special or Technical Instruction of Officers.—All Lieutenants, with the exception of such as are excused by the Colonel, go through an annual course of surveying and reconnaissance. From the notes and sketches they have made, they prepare certain maps and memoirs already alluded to.

The periods devoted to such work are so arranged by the Colonel that other practical work is as little interfered with as possible, and that the Officers are given sufficient time to have their drawings, &c., finished a month before the General Inspection.

Besides these exercises, Lieutenants are detailed to make sketches and road reports whenever marches are practised. These must be in the Colonel's hands with the next day's reports, at the latest.

Lieutenants go through an annual course of practical instruction under the Captains-Adjoints of the School in such pyrotechny as is more immediately concerned with military engineering, and in signalling. Instruction is also given them by the Captain-Adjoint in charge of stores, and the Captain Commanding the Company of Engineer Train, in the classification and packing of tools and stores, the loading and unloading of wagons and pack animals, and the classification and use of harness and saddlery and matters connected with transport generally.

Captains and subalterns are annually formed into "brigades" and practised in tracing parallels and approaches by night and day under the *Chefs de Bataillon*, the work forming a special subject of study by the senior Officers concerned beforehand. The whole is under the general supervision of the Lieutenant-Colonel.

Finally, the Colonel has to see that no opportunity is lost of affording Officers the means of perfecting themselves in such practical work as they would be called upon to perform in all the phases of a campaign.

Instruction of Officers and Men of the Reserve and Territorial Army.

Officers and men of the Reserve, when called out for training, are put through a course of practical instruction agreeably with the Ministerial decisions of the 2nd May, 1878, and 19th March, 1879, special instructional staffs being detailed for their benefit.

Territorial Companies of Engineers are put through a course under their own Officers under the supervision of a *Chef de Bataillon* of the Regiment, according to programmes issued from time to time by the Minister of War (see Circular of the 20th March, 1879).

To enable the Engineer Regiments to follow without interruption their technical training, they are not called upon to perform garrison duties unless the Infantry and Cavalry quartered in the place are not sufficient for the purpose. Before commencing any particular course of instruction out of doors, the Colonel makes certain necessary arrangements with the Officer Commanding the garrison as regards times and places of assembly, &c., and the latter has to make such arrangements as regards garrison duties as shall interfere as little as possible with the training of the Engineers.

The Colonel makes his own arrangements for the training of the Company of Engineer Train and the section *hors rang* of regimental tradesmen, according to the principles observed in the general training of the Regiment.

A section of 2 sergeants, 4 corporals, and 30 sappers belonging to the Depot Company and selected for their knowledge of the trades concerned, throughout the Regiment, are permanently employed in the workshops of the School, both in keeping the tools and stores used for instructional purposes in repair, and making and keeping in repair the stores of the Engineer Parks belonging to the School. These men must all have done at least one year's practical instruction. They are struck off all duties, and only attend to certain drills and military exercises.

Besides these men permanently employed, a certain number of selected men are detached from their Companies for employment in the workshops, so as to acquire the knowledge necessary for keeping the tools and stores of

the Company Parks in the field in repair. They are detailed by the Colonel, so that the employment may not interfere with their other technical and military training.

No non-commissioned officer or sapper is allowed to undertake private work, but may under certain circumstances be employed by the *Génie de Place*, or what we should call the "Royal Engineer Department."

Non-commissioned officers and sappers who distinguish themselves for zeal and ability are mentioned in orders at the end of every quarter. Their names also appear in conspicuous places in the School during the following quarter. A note is made of this to govern future promotion.

On passing into the Reserve, certificates of proficiency in the various kinds of training may be given, on application, by the Colonel. Similarly the School Commandant may give certificates to the men who have been employed in the workshops.

The courses, classes, and the number of attendances every man has attended are inserted at the end of every year in his pocket ledger.

Certain limits are allowed within which the Colonel may modify the present Regulations (of 25th June, 1885), but all deviations are to be reported at the General Inspection.

Elaborate programmes are annually made out by the School Commandant on all theoretical, practical, special, or technical training during the ensuing year, as well as on the care of the military *matériel* in charge of the School, with the expenses likely to be incurred in keeping it in repair. He may be assisted in drawing up these reports by certain Officers of the Regiment detailed by the Colonel.

Briefly, these reports are divided into three chapters—the first devoted to theoretical instruction, the second to practical instruction, and the third to the care of military *matériel*. These chapters are divided into articles, and again subdivided, when necessary, into sections. These reports contain the estimates for the ensuing year, and where the expense cannot be shown under any of the chapters, it forms the subject of a special chapter.

To these are attached special programmes for siege operations and experiments. Experiments with their estimated expense form a special chapter.

A special chapter is also devoted to stores of all kinds required for the ensuing year.

All these programmes, accompanied by the necessary drawings, estimates, &c., must be in the hands of the Colonel before the 31st December, and in the hands of the War Minister before the 1st February.

A summary of the programme is also forwarded by the School Commandant and *Directeur du Génie* through the Commanding Engineer (*Commandant du Génie*) of the District to the Inspector-General. The latter decides on the work that is to be executed.

All work connected with the repair and maintenance of existing works, buildings, exercising grounds, &c., as well as the construction of new works and buildings, is left to the *Génie de Place*.

As regards the current school expenses, the School Commandant holds the same financial position as a *Chef du Génie*, or Commanding Engineer.

THE ENGINEERS WITH THE ARMY IN THE FIELD.

The Engineer Staff.

The 18 French Army Corps would, in case of war, be most probably formed in some 4 or 5 Armies of from 3 to 5 Army Corps and 1 or 2 Cavalry Divisions each. To the Headquarter Staff of an Army there would be a Commanding Engineer—a General Officer—with a Staff, an Army Engineer Park, an Army Bridge Train, a Technical Railway Section, and a Railway

Company and Park. Details, however, are wanting on the composition of Army Staffs.

The Engineer Staff of a mobilized Army Corps would comprise a Brigadier-General or Colonel of the Engineer Staff as Commanding Engineer, a *Chef de Bataillon* as Executive Officer, a *Chef de Bataillon* as Park Director, 2 Captains of the Engineer Staff, 2 *Adjoints du Génie*, and 2 clerks, with 1 one-horse baggage cart, 1 two-horse office and provision cart, and 2 drivers, 7 servants, and 16 horses; or 6 Officers, 11 non-commissioned officers and men, 16 horses, and 2 wagons in all.

The Engineer Staff of a mobilized Division would comprise a *Chef de Bataillon* only, with 1 servant and 2 horses.

In the case of siege operations a special Engineer Staff would be appointed to each attack, &c.

To the Staff of the Commander-in-Chief of two or more Armies would be attached a General Officer of Engineers of high rank as Inspector-General of Engineers. He would be assisted by a Staff of Engineer Officers, but no details for this are apparently laid down.

A mobilized French Army Corps is a copy of the German. Briefly it comprises the following:—

An Army Corps Headquarter Staff
 2 Infantry Divisions complete.
 A Battalion of *Chasseurs à Pied*.
 A Cavalry Brigade.
 The Corps Artillery.
 The Corps Artillery Park.
 A Train Squadron.
 A Corps Ambulance.
 A Provision Column.
 A Telegraph Section.
 A Company of Pontoneers with Bridge Train.
 An Engineer Company and Corps Park.
 A Horse Dépôt.
 A Train Dépôt, &c.

The total ration strength of Army Corps is—

10 General Officers.
 947 Officers.
 35,107 Non-commissioned officers and men.
 9,678 Horses.
 1,759 Carriages.

The fighting strength is 25 Battalions of Infantry and *Chasseurs à Pied*, 8 Squadrons of Cavalry, 16 Batteries of Artillery, 2 Companies of Engineers, and a Bridge Train, comprising—

24,820 bayonets.
 1,200 sabres.
 96 guns.

Engineer Troops.—Sapper Companies.

Although there is nominally a Battalion of Engineers of 4 Companies to an Army Corps, only 2 Companies would belong to it in the field. One of these would be divided in 2 Half Companies, attached to the Divisions. The other Company would be kept in reserve.

The war strength of a Company is laid down as : 2 Captains, 2 subalterns, 1 Reserve Officer, 1 sergeant-major, 1 quartermaster-sergeant, 10 sergeants, 16 corporals, 6 *maîtres-ouvriers* or foremen artificers, 2 buglers, and 186 sappers.

The Park of a Company comprises 2 four-horse Engineer store wagons, 2 pack animals, 2 one-horse baggage carts, and 2 one-horse provision carts, with a detachment of the Engineer Train of 10 drivers, and 2 riding, 8 draught, and 2 spare horses. The baggage and provision carts would be drawn by requisitioned horses and driven by men of the Company. This is exclusive of Officers' horses.

There are 100 Company Parks, 20 being in reserve.

The Half Company, with its Half Company Park attached to a Division, forms the *Génie Divisionnaire*. This, with the *Chef de Bataillon* or Commanding Engineer of the Division, comprises altogether 4 Officers, 126 non-commissioned officers and men, with 8 riding, 4 draught, and 1 spare horses, 1 pack animal, and 3 wagons and carts.

The Company kept in reserve is accompanied by its Park complete.

There is in addition to every Army Corps a Reserve Park or *Parc de Corps d'Armée* in addition. It is under a Park Director on the Army Corps Staff. The Park comprises a detachment of Engineer artificers of 3 non-commissioned officers and 6 sappers, and a detachment of 3 non-commissioned officers, 1 trumpeter, 2 shoeing smiths, and 46 drivers of the Engineer Train, with 6 riding, 68 draught, and 5 spare horses. The carriages are 7 large six-horse covered tool wagons, 2 ordinary six-horse store wagons, 1 four-horse field forge, 1 four-horse dynamite wagon, and 1 four-horse forage wagon, or 12 carriages in all. The large wagons carry all kinds of Engineer tools and appliances, one of the ordinary store wagons rope and bridging gear, and the other portable Engineer or Infantry tools. There are 20 (19?) of these Parks.

An Army Engineer Park (*Parc d'Armée* or *Grand Parc du Génie*), of which there are 4, comprises an Engineer detachment and 2 Companies of Military Train. The Engineer detachment consists of an *ouvrier d'Etat* (see p. 1191), 3 non-commissioned officers, and 15 sappers. The carriages are as follows :—28 wagons carrying sappers' tools and appliances, 2 carrying portable Engineer or Infantry equipment, 2 carrying portable miners' tools, 3 carrying small tools, stores, and appliances, 3 carrying sand-bags, 1 powder wagon, 3 dynamite wagons, 1 wagon carrying a derrick and appliances, 2 field forges, 4 wagons carrying ropes, &c., for bridging, 2 pontoon wagons carrying boats, 2 do. carrying trestles, 3 wagons carrying piles, and 1 carrying a pile-driving machine ; or a total of 58 carriages, of which 45 carry Engineer, and 13 bridging, stores. There are besides 6 wagons for the 2 Train Companies, consisting of 2 field forges, 2 store wagons, and 2 forage wagons, giving a total of 64 carriages in all.

The total Park would comprise some 10 Officers, 262 non-commissioned officers and men, 415 horses, and 64 (or according to some accounts 66) carriages.

The total number of Engineer Parks are then :—100 Company Parks, of which 3 would be required per Army Corps at the outset, or 57 in all, 20 (19?) Army Corps Parks, and 4 Army Parks. The *matériel* of all these Parks is equally distributed and kept in store at the four Schools of Military Engineering.

The following Table shows the various tools carried.

	In an Army Park.	In an Army Corps.			In a Division.	
		In the Army Corps Park.	On the wagons of the Company Parks.	Carried by the men of the Companies.	On the wagons of the Half Company.	Carried by the men of the Half Company.
Shovels	4,200	1,050	400	100	100	25
Spades	806	172	8	..	2	—
Pickaxes	2,135	530	200	100	50	25
Picks	436	35	12	..	3	—
Axes, felling	805	175	32	..	8	—
Axes, hand	163	35	16	76	4	19
Billhooks	1,284	315	60	24	15	6
Saws . . . . .	..	28	24	4	6	1
Chain saws	20	..	..	4	..	1
Smiths' tools, sets	400	..	..	12	..	3
Carpenters' tools, sets	650	..	..	28	..	7
Chests with miners' and quarrymen's tools	10	..	8	..	2	—
Chests with ropes, bridging gear, lighting apparatus, &c.	16	4	4	..	1	—
Wagon poles	30	4	4	..	1	—
Powder (kil.)	400	—	—	—	—	—
Dynamite (kil.)	900	300	175 · 20 ¹	..	43·8 ¹	—

¹ Carried on pack animals.

The total entrenching tools with a Division is then 125 shovels, 2 spades, 75 pickaxes, 3 picks, 8 felling axes, 23 hand axes, 21 billhooks, 7 saws, 1 chain saw, 3 sets of smiths' tools, and 7 sets of carpenters' tools.

The total entrenching tools with an Army Corps would be 1,550 shovels, 180 spades, 830 pickaxes, 47 picks, 307 felling axes, 127 hand axes, 399 billhooks, 56 saws, 4 chain saws, 12 sets of smiths' tools, and 28 sets of carpenters' tools.

The portable equipment, which is always carried on service, is equally distributed in the Half Companies to make these independent.

Engineer Troops—Railway Companies.

The war establishment of a Railway Company is laid down as : 2 Captains, 4 Subalterns, 1 sergeant-major, 4 quartermaster-sergeants, 16 sergeants, 22 corporals, 2 buglers, and 247 sappers.

Like Sapper Companies, Railway Companies are organized to be used as independent Half Companies.

To each Half Company would be attached in war the following detachment of Engineer Train and Park : 1 sergeant, 2 corporals, 1 shoeing smith, and 20 drivers, with 4 riding horses, 26 draught horses, and 2 spare horses, and 1 four-horse Engineer tool wagon (the same as in the Sapper Company Parks).

2 four-horse Engineer wagons for carrying sappers (*sapeurs montés*),¹ 1 four-horse powder and dynamite wagon, 1 six-horse large tool and implement wagon, 1 four-horse field forge, besides 2 one-horse baggage carts, and 1 two-horse provision cart; in all, 24 non-commissioned officers and men, 18 carriages, and 32 horses. The baggage and provision carts would be drawn by requisitioned horses, and driven by men of the Half Company. There are 20 Half Company Parks. The *matériel* of these is kept in store at the four Schools of Military Engineering.

CLOTHING, ARMS, AND ACCOUTREMENTS.

The uniform of the French Engineers is much the same as that of the Artillery, except that the facings are of black velvet, and, instead of the crossed guns, they wear a coat of arms on the shako, buttons, &c. The tunic, great coat, and shell jacket are dark blue, with the number of the Regiment on the collar. The trousers are dark blue with a double red stripe as in the Artillery. The shako is dark blue, and has red chevrons as in the Artillery. The Sapper Companies wear a red pompon, but the Train Companies a red horsehair plume. The képi is dark blue with red piping. The belts are black, and the buttons yellow. Dismounted men wear low shoes and gaiters, white in summer, leather in winter. Mounted men wear half-boots and booted overalls of the well-known French cavalry pattern. The men of the Railway Companies wear a small railway engine worked in red worsted on the right arm.

The Sapper Companies are armed with the Infantry rifle and sword bayonet. Train soldiers are armed with Cavalry swords and revolvers. Adjutants, non-commissioned officers, sergeant-majors, and bandsmen wear a straight dress sword. Men armed with rifles carry 78 rounds in the field—36 rounds in two pouches on a waistbelt, and the remainder in the pack.²

The sapper carries the same iron rations as the Infantry soldier. These are two rations of biscuit or bread, preserved meat or salt pork, salt, sugar, preserved vegetables, coffee, &c.

Two days' similar rations are carried in the Company provision carts.

The iron rations are not supposed to be touched without an order.

Wine or spirits are only served out by order of the General Commanding.

SERVICES SOMETIMES CONNECTED WITH THE ENGINEER ARM.

RAILWAYS.

The French Railway Organization with its serious drawbacks has already been described in vol. xxix, No. CXXVIII, page 251 of the Journal under the heading of the French Railway Corps.

CARRIER PIGEONS.

This is practically an Engineer service in the French Army. It has been fully described in an article by Captain H. T. W. Allatt in vol. xxx, No. CXXXIII (1886), page 107 of the Journal.

BALLOONING.

Balloonning, with carrier pigeons, the electric light, and other means of communicating messages through the air, all come under the *Commission des*

¹ Probably intended to carry Sapper Detachments to accompany Cavalry Divisions.

² French ammunition is made up in packets of six rounds.

Communications par Voie Aérienne, which is under the Director of the Fortification Dépôt, the Sub-Director of the same acting as President. They may all be practically considered as Engineer services, but as yet, with the exception of the pigeon service, nothing is known as regards any of them being placed on an organized military footing.

PART III.—THE PONTONEERS.

Peace Organization.

The Pontoneers of the French Army belong to the Artillery. When the Law on the reorganization of the Army was passed in 1875, this was a question that gave rise to considerable discussion, the Engineers claiming it as a branch of their service. That it was rightly an Engineer service was hardly denied, but the objection of the Artillery to part with it, based mainly, if not entirely, on questions of promotion, carried the day in the end. It must be generally admitted that the present arrangement is a very faulty one.

There are two Regiments of Pontoneers, styled *Régiments d'Artillerie-Pontonnières*, numbered 1 and 2, and stationed at Avignon and Angers, in the 15th and 9th Army Corps Districts, respectively.

Each Regiment comprises a Staff and 14 Companies. The 1st Regiment has a Company detached in Algeria.

In war the Regiment would be broken up, and the Companies distributed to Armies and Army Corps, as will be shown further on.

The Staff of a Regiment comprises a Colonel in command, a Lieutenant-Colonel, 3 *Chefs d'Escadron*, a Major, a Paymaster (Captain), an Assistant Paymaster (Subaltern), a Clothing Officer (Captain), 2 Surgeons, and a Veterinary Surgeon. The *Petit Etat Major* and *Section Hors Rang* of the Regimental Staff comprise: 4 Adjutants (non-commissioned officers), 4 foremen-artificers, 1 sergeant-major, 8 sergeants, 1 quartermaster-sergeant, 7 corporals, 2 trumpeters, and 12 privates.

The total Regimental Staff is 12 Officers, and 39 non-commissioned officers and men, with 20 riding horses.

The Company Officers of a Regiment are 14 First Captains, 14 Second Captains, 14 First Lieutenants, and 14 Second Lieutenants.

The 1st Regiment had at the beginning of the present year 1 First Lieutenant and 13 Sub-Lieutenants in the Reserve, and the 2nd Regiment 1 First Lieutenant and 18 Sub-Lieutenants in the Reserve.

The Officers serving are borne on the general list of the Artillery.

The *effectif budgétaire* of the Pontoneers is 156 Officers and 2,930 non-commissioned officers and men.

War Organization.

On mobilization each Army Corps would receive a Company of Pontoneers, and the remaining Companies would be attached to Armies or formed in Reserve.

The Bridge Train of a mobilized Army Corps would comprise a Company of Pontoneers and a Company of Artillery Train (belonging to the Artillery Brigade of the Army Corps), by which the Train would be horsed.

The Bridge Train of an Army would comprise a Company of Pontoneers and two Companies of Artillery Train, forming two Army Corps Bridge Trains.

The war establishment of a Company of Pontoneers is laid down as:

2 Captains, 3 subalterns, an Adjutant (non-commissioned officer), a sergeant-major, 8 sergeants, 1 quartermaster-sergeant, 7 corporals, 12 foremen artificers, 2 trumpeters, and 124 privates; or 5 Officers, 156 non-commissioned officers and men, and 7 horses.

The war establishment of an Artillery Train Company would be: 3 Officers, 174 non-commissioned officers and men, and 300 horses.

The total strength of an Army Corps Bridge Train would then be: 8 Officers, 330 non-commissioned officers and men, and 307 horses.

An Army Bridge Train would be commanded by a Field Officer of Pontoneers, and attached to him would be a Reserve Officer, a Surgeon, and a Veterinary Surgeon. The total establishment would be 15 Officers, 505 non-commissioned officers and men, and 612 horses.

The Senior Pontoneer Officer is always in command.

An Army Corps Bridge Train is divided into 2 sections and a reserve. Each section comprises 10 pontoon wagons, 7 general store wagons, and a field forge. The Reserve comprises a pontoon wagon and a general store wagon. The total number of wagons in the Bridge Train is 38, all six-horsed, besides a field forge, 2 general store wagons, 6 provision wagons, and a forage wagon, making the total number of carriages 47 in all.

The bridging stores carried are 16 pontoons, 4 trestles, and 2 rowing boats, and the total length of bridge that can be thrown is 64 metres.

The length of bridge that can be thrown by an Army Bridge Train is double this, or 128 metres.

Bridging Material.

As Pontooning is an Artillery service we do not propose to describe the bridging *matériel* in detail.

The pontoon used is a wooden boat of the 1855 pattern. It is built of pine strengthened with ribs and knees of oak. It is 30 feet 10 inches long, 5 feet 9 inches wide at top, 4 feet 4½ inches wide at bottom, 2 feet 10 inches high at the stern, 2 feet 7 inches high at the bow, and 2 feet 7 inches high amidships. Its weight is 1,450 lbs., and sinking load 18,700 lbs. It draws, with ordinary superstructure, 1 foot 7½ inches of water, and can carry 25 infantry soldiers in marching order.

The rowing boat is built of the same material as the pontoon, but is much smaller.

The trestle is of the Birago pattern, with long and short legs, and oak soles to prevent sinking. The baulks are of two kinds, ordinary and cleated, as in the Birago bridge equipment. The length of a bay from centre to centre of pontoons is 19 feet 6 inches, and the length between bearings 14 feet. There are seven baulks in a bay, besides two used as ribands. The shore-end bay is 17 feet 6 inches long, and the clear bearing of baulks 13 feet 5 inches.

The length of a trestle bay is 18 feet, and the clear bearing of baulks 17 feet 8 inches.

This is the ordinary bridging, or *pontage à petite portée*. It can take Infantry in fours, Cavalry in twos, and Field Artillery. For Siege Artillery and exceptionally heavy loads the bays would be reduced in length, and the number of baulks increased.

The roadway is 9 feet 6 inches wide in the clear.

The bridging parties are 12 non-commissioned officers and 85 men using pontoons only, and 13 non-commissioned officers and 97 men using pontoons and trestles.

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NOTICES OF BOOKS.

Napoleon als Feldherr. By GRAF YORCK V. WARTENBURG. Zweiter Theil. Berlin. Mittler. Pp. 424. Size 8 $\frac{3}{4}$ " x 6" x 1'. Weight under 1 $\frac{1}{2}$ lbs. Price, 2 vols., 17s. 6d.

We greet with pleasure the appearance of the second part of this work.

Although not always in accord with the author's conclusions, we recognize with satisfaction the care with which he has carried out the plan of criticism sketched out in the first part, and with which the divisions of this further study of the military career of the Emperor Napoleon have been treated.

In this issue he discusses successively the campaigns of 1808 in Spain; of 1809 in Germany; of 1812 in Russia; of 1813 in Germany; of 1814 in France; and the final catastrophe in 1815.

The issue of this part is completed by two maps; one of the passage of the Danube at the island of Lobau, the other of the scene of operations in Russia in 1812.

While the first part depicted the rise and growth to the highest pitch of the great and successful warrior, the second treats of the further progress of his ambitious career, of the gradual weakening of his personal conduct of the operations of war, and of his subsequent and irretrievable eclipse.

There is much to be learnt by all leaders of troops or students of military history from a so careful consideration of these different phases of Napoleon's career.

In the first of the three periods he was great as a tactician, and unrivalled as a strategist; in the second, great as were his strategical successes, he was hindered and encumbered by his political position; in the third and last these difficulties were not only greatly increased, but with gradual weakening of his mental, certainly of his physical powers, his obstinate self-will led him too frequently to act, not as the circumstances plainly dictated, but as he chose them to appear.

Further than this the author points justly to the fact that the personal direction of operations by one man, who solely and alone conducts both the strategical and tactical operations, can only continue to be successful so long as his personal activity continues unweakened, and does not lead to the formation of subordinate leaders who can be absolutely reliable when distant from the directing hand.

Other causes may also be quoted as leading to Napoleon's downfall. The very honours and wealth which he had heaped on his subordinates had led to self-indulgence, to unwillingness to undergo the exhaustion and hardships of war, the success of which was, to say the least, doubtful, and to impatience of a leading which, from his constant change of plan, led to harassing marches and counter-marches.

The author further points out that the enormous scale on which the later campaigns were carried out, actually prevented that intimate personal and tactical direction which was so eminent a factor in Napoleon's earlier campaigns; and from this he draws deductions affecting the operations of the present day, with which we can only cordially agree.

One cause of the failure in Russia, also to a minor degree of the difficulties in Austria in 1809, is only lightly alluded to by the author. We advert to the weakening of discipline so graphically portrayed by de Fézensac and Brand; to the horrible plundering and destruction which was inevitable on the deficiency of regular supplies, and to the terrible necessity, therefore, of a retreat through an already devastated hostile country.

We cordially recommend this most creditable work of a thoughtful Officer of junior rank to the perusal of those who look upon the study of our profession as about the most profitable employment of leisure hours to which an Officer can devote himself.—C. B. W.

The Naval Annual, 1886. By Lord BRASSEY, K.C.B. Griffin, Portsmouth, 1886. Pp. 550. Size 10" x 7" x 2". Weight under 3 lb. 8 ozs. Price 7s. 6d., post free. London Agents, Simpkin, Marshall, and Company.

This is the first appearance of a publication which is intended to be an annual; and the object of which is to bring together a large amount of information on naval subjects which has hitherto been obtainable only by consulting numerous publications chiefly from foreign sources. The compiler in his short preface earnestly invites the co-operation of naval and professional men. It seems almost needless to say that the book is worthy of the source from which it emanates. It supplies a want keenly felt hitherto.

Colonial France. By C. B. NORMAN, late 90th Light Infantry. Allen, London. 1886. Pp. 331. Size 9" x 6" x 1½". Weight under 2 lbs. Price 15s.

An interesting history of French Colonization brought down to the present time. The author also considers this question in relation to ourselves.

La Tactique au XIII^e Siècle. Par HENRI DELPECH. Paris, Picard, 1886. 2 vols. Pp. 842. Size 10" x 6½" x 2". Weight 3 lbs. 2 ozs. Price 10s.

This is an extraordinary work. The author has spent eleven years in compiling a most erudite publication for the purpose of demonstrating that 600 years ago there existed in armies tactics of each arm, and also *La Grande Tactique*. The tactics of the thirteenth century are hardly matters with which a nineteenth-century soldier has much to do, but nevertheless no one can fail to read with great interest the result of M. Delpich's profound researches, which bring vividly before the eye the minutest details of the warfare of a period, when cavalry were, in the author's opinion, the chief arm, and infantry but auxiliary to it. The work will well repay perusal.—L. A. H.

Précis Politique et Militaire des Campagnes de 1812 à 1814. Extrait des Souvenirs inédites du Général Jomini. Par F. LECOMTE, Colonel Fédéral Suisse. "Nouvelle Revue," Paris, 1886. 2 vols. Pp. 651. Size 9½" x 6½" x 1½". Weight 2 lbs. 10 ozs. Price 16s.

A valuable contribution to our stores of military history. The memoir of Jomini, which precedes the *Souvenirs*, is very interesting, and certainly elicits sympathy with a chequered and not altogether successful career.

Experiences of a Woolwich Professor. By Major-General A. W. DRAYSON. Chapman and Hall, London, 1886. Pp. 312. Size 8½" x 5½" x 1½". Weight 1 lb. 7 ozs. Price 8s.

This book contains, besides the autobiographical reminiscences, some thoughtful remarks on education. We almost wish that the astronomical chapters had been omitted, as they are hardly experiences special to a "Woolwich Professor."

English Worthies. Edited by ANDREW LANG. *Admiral Blake*. By DAVID HANNAY. Longmans, London, 1886. Pp. 190. Size 7½" x 5" x 3½". Weight under 12 oz. Price 2s. 6d.

A well written and excellent little biography of one of England's greatest naval heroes.

India under British Rule from the foundation of the East India Company. By J. TALBOYS WHEELER. Macmillan, London, 1886. Pp. 302. Size 9" x 6" x 1". Weight under 1 lb. 1 oz. Price 12s. 6d.

This book contains a good succinct account of what its preface and title professes it to be. The last chapter is an exceedingly useful one in describing precisely the changes that have taken place under the various Governments of India since that

Government passed to the Queen. From the fact that the author has held high appointments in India, which must have given him opportunities of consulting the best authorities on the subjects of which he writes, it is probable that for its size the book may be considered one of the best and most concise works on the subject that has appeared for some time past, and it will be found very useful for educational as well as general reading.—M. G.

Fifteen Years of Army Reform. By an OFFICER. Blackwood, London, 1884. Pp. 88. Size $8\frac{1}{4}'' \times 5\frac{3}{8}'' \times \frac{1}{2}''$. Weight under 10 ozs. Price 2s. 6d.

Although published two years ago, this *brochure* has only just been sent for notice. The weak points in the reforms adopted are exposed with great ability; but unfortunately the tone of the work is so bitter and so one-sided, that in reading it we seem involuntarily to come at once to the conclusion that the case put forward by "an Officer" is greatly overstated. Had "an Officer," carefully avoiding personalities, temperately pointed out the errors committed, he would have done good service. As the book stands it is a brief for the non-reformers.

Campagne du Nord en 1870-71. Par PIERRE LEHAUTCOURT. Lazauville, Paris, 1886. Pp. 255. Size $10'' \times 6\frac{1}{2}'' \times 1''$. Weight under $1\frac{1}{4}$ lbs. Price 3s.

This book is a most valuable contribution to the literature of the Franco-German War. It is temperate in style, and so far as we can judge accurate and reliable. It forms a pleasing contrast to much of the so-called histories drawn up by French writers. It is to be hoped that this volume is but the first of a series of similar monographs. The author has brought to his task a determination to be unbiassed by political or other disturbing considerations, and to state facts as they occurred, and not merely as his countrymen would like to see them represented. We know this war pretty well from a German point of view; at last we are about to see that war in a less one-sided aspect.—L. A. H.

The Autobiography of Serjeant William Lawrence, a Hero of the Peninsular and Waterloo Campaigns. Edited by G. BANKES. Sampson Low, London, 1886. Pp. 250. Size $7\frac{1}{2}'' \times 5\frac{1}{4}'' \times 1\frac{1}{8}''$. Weight under 1 lb. 2 ozs. Price 6s.

This book was composed by a man who could not write, and who dictated his experiences to a fellow servant. Of these materials Mr. Bankes has undertaken the editorship. Any record of personal experience of the ranks in old days cannot fail to be of interest, but the preface leads us to expect rather more than we find in the narrative.

Wars of Queen Victoria's Reign, 1837-87. By the Hon. Mrs. ARMYTAGE. Sampson Low, London, 1886. Pp. 254. Size $7\frac{1}{2}'' \times 5\frac{1}{2}'' \times 1''$. Weight under 1 lb. 2 ozs. Price 7s. 6d.

A very useful and concise war diary of the Empire.

Ranks and Badges, Precedence, Salutes, Colours, and Small Arms in H.M. Army and Navy and Auxiliary Forces, including a Record of the Military and Naval Forces in the different Countries of Great Britain and Ireland. By Lieut. O. L. PERRY, 2nd Vol. Bat. L.N. Lancashire Regt. Clowes, London, 1887. Pp. 416. Size $6\frac{1}{2}'' \times 4\frac{1}{2}'' \times 1\frac{1}{2}''$. Weight under 1 lb. Price 6s.

This work is the outcome of a vast amount of industry and research, and contains much interesting and valuable information difficult to find elsewhere. It would be a desirable addition to all military libraries.

Vice in the Horse, and other Papers on Horses and Riding. By E. L. ANDERSON. Douglas, Edinburgh, 1887. Pp. 70. Size $9'' \times 6'' \times \frac{1}{2}''$. Weight under 12 ozs. Price 5s.

There is not in this book much, if anything, more than is learnt by going through

the ordinary course in a military riding school. Cross country riders may possibly look down on such a course, but a perusal of Mr. Anderson's work may perhaps show them that even their style of riding might be benefitted by knowing how to make full use of the "aids" employed in military equitation.—D.

Battalion Drill Made Easy. By W. GORDON.

Messrs. Gale and Polden, of Chatham, are continuing the publication of their series of useful military works. Vol. 23 is a "Guide to Court Martial Procedure," by Lieut. C. G. Morrison, Rifle Brigade; vol. 19 is the "Officers' Pocket Book;" vol. 26 is "The Sergeants' Pocket Book;" vol. 27 is "Battalion Drill Made Easy," the last three being by W. Gordon, 2nd Battalion Gordon Highlanders, late Sergeant-Major 2nd Battalion Scots Guards. The prices of the works, which are all small, are 1s. 6d., 2s. 6d., and 2s. and 3s. 6d. respectively, post free.

Messrs. Gale and Polden have also issued a guide to Army Signalling by Lieutenant Eales of the Buffs. Price 6d., or 5s. per dozen, post free.

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The Journal

OF THE

Royal United Service Institution.

VOL. XXX.

1886-7.

APPENDIX.

PROCEEDINGS OF THE FIFTY-SIXTH ANNIVERSARY MEETING.

THE FIFTY-SIXTH ANNIVERSARY MEETING of the Members was held in the Theatre of the Institution on Saturday, March 5th, 1887.

THE RIGHT HON. LORD HARRIS, UNDER SECRETARY OF STATE FOR WAR, IN THE CHAIR.

I. The Secretary read the Notice convening the Meeting.

THE CHAIRMAN: This will be a convenient moment for me to explain that my Rt. Hon. Friend, the Secretary of State for War, owing to his Official and Cabinet duties, finds it impossible to attend here to-day, very much to his own regret, and I am sure to yours. He has at the last moment asked me to act as his substitute—a very inadequate one—and I therefore must beg your indulgence under these circumstances, and also your assistance in carrying through the business of the day.

THE SECRETARY: Lord Charles Beresford, M.P., who was anxious to have attended the meeting to-day, having been unfortunately called away from town has written me this letter, which I will read:—

March 4, 1887.

I am very sorry that I cannot attend the Meeting of the United Service Institution to-morrow as I intended, but I must go down to see the trial of the Lay Torpedo, and I cannot get back in time. I hear there is some probability of the present Institution being taken away from us by the landlord (The State); but I believe this is only a threat which has been held over us for more or less 20 years. However, as this threat no doubt does a certain amount of damage to the welfare of the Institution, would it not be well for the Governing Authorities to ask for some definite statement from the powers who have the right of eviction and the conditions? We should then have something definite to go upon. I most sincerely hope that the Institution will never go downhill, as I am satisfied that its objects and its lectures are of infinite use to the Services and the Country. I can testify to the use I have personally found it, as I am satisfied by result that the Machine Gun question would never have been thoroughly ventilated at any other place I know, with the same results as to supply for the Services. The mere fact of 21,078 numbers of the Journal having been disposed of last year, shews the appreciation in which it is held by the Services and the Public. Anything that I could ever do to further the interests and welfare of the Institution I would always joyfully undertake.

HOUSE OF COMMONS.

Yours very faithfully,

CHARLES BERESFORD.

4 M 2

Sir EDWARD FANSHAW: I should like to mention, with reference to what Lord Charles Beresford has written, that he is not aware that the Council has been for a very long time in communication with the Government upon this very matter, and is so at this moment.

II. The Fifty-sixth Annual Report was read as follows :—

1. The Council have the pleasure of submitting their FIFTY-SIXTH Annual Report.

MEMBERS.

2. Thirty-five Life Members and One hundred and Six Annual Subscribers, making a total of One hundred and Forty-one new Members, joined the Institution during the past year. The loss by death amounted to Ninety, and Sixty Members withdrew their names.

STATEMENT OF CHANGES AMONG THE MEMBERS SINCE 1ST JANUARY, 1886.

	Life.	Annual.	Total.
Number of Members, 31st December, 1885	1,428	2,949	4,377
Number of Members joined during 1886 ..	35	106	141
	1,463	3,055	4,518
Changed from Annual to Life + 5	— 5	— 5	—
	1,468	3,050	4,518
	Life.	Annual.	
Deduct—Deaths during 1886 ..	26	64	
Withdrawals ..	—	60	
	26	124	26
			124
			150
Actual number on 31st December, 1886 ..	1,442	2,926	4,368

A tabular analysis of the present and past state of the Institution is given in the Appendix, page 7.

FINANCE.

3. An Abstract of the Accounts, duly audited, is given on the following page.

GENERAL ABSTRACT OF THE ACCOUNTS OF THE ROYAL UNITED SERVICE INSTITUTION.
FROM 1st JANUARY TO 31st DECEMBER, 1886.

EXPENDITURE.		£	s.	d.	RECEIPTS.		£	s.	d.
Secretary's Salary	400 - -	Annual Subscriptions, at 10s.	...	...	...	136 10 -
Librarian's Salary	180 - -	" " above 10s.	...	...	...	2,585 15 6
Clerk's Salary	75 7 6	" " arrears	...	...	...	26 10 -
Servants' Wages	535 4 6	" " advance	...	...	...	9 1 -
Ditto Clothing...	74 15 -	Entrance Fees	...	...	...	2,757 16 6
Insurance...	22 15 -	Dividends	...	...	...	141 - -
Ground Rent	198 13 -	Sale of Journals	...	...	...	514 1 4
Fuel	58 4 8	Miscellaneous Receipts	...	...	...	456 5 6
Lighting	31 14 9	Interest on Money on Deposit	...	...	...	1 16 7
Assessed Taxes	92 6 10	Government Grant	...	...	...	12 12 5
Rates	124 10 8		...	...	...	600 - -
Artificers	92 14 -		...	...	...
Library (purchase of Books and Maps, &c.)	192 19 4	Life Subscriptions received in 1886	...	...	...	358 - -
Museum	2 17 9		...	...	...
Advertisements	194 18 6		...	...	...
Printing, Stationery, &c.	174 5 1		...	...	...
Lectures	4 18 7		...	...	...
Journal	1,481 18 1		...	...	...
Postage	27 17 5		...	...	...
House Expenses and Sundries	296 13 10		...	...	...
Gold Medal	63 16 3		...	...	...
Cash repaid to Agents	11 10 -		...	...	...
Charges from Agents	19 13 -		...	...	...
For £295 11s. 4d. " at 101½	300 - -		...	...	...
For £295 11s. 4d. " at 101½	300 - -		...	...	...
Balance { Cash in Bank	111 2 2	Cash in Bank, 31st December, 1885	...	...	...	200 5 9
Balance { Cash in hand, Postage account	- 11 9	Cash in hand, Postage account	...	...	...	13 7
									45,042 13 8

J. DAY,
Accountant.

Audited and found correct—
2nd February, 1887.
E. R. WETHERED, Lt.-Col. }
LIONEL C. DRUMMOND, }
Auditors.

ESTIMATE OF RECEIPTS AND EXPENDITURE FOR THE YEAR 1887.

EXPENDITURE.			RECEIPTS.		
	£	s. d.		£	s. d.
Secretary's Salary and Lodging allowance	400	- -	Balance at Bankers', 31st Dec., 1886	111	- -
Librarian's Salary	190	- -	Annual Subscriptions :		
Clerk's do.	76	- -	£ s. d.		
Servants' Wages	537	- -	At 10s. .. 150	- -	
Ditto Clothing	75	- -	Above 10s. 2,700	- -	
Insurance	23	- -		2,850	- -
Ground Rent	205	- -	Entrance Fees	200	- -
Fuel	60	- -	Dividends	520	- -
Lighting	50	- -	Government Grant	600	- -
Assessed and Income Taxes	90	- -	Sale of Journals	450	- -
Parish and Water Rates	140	- -			
Artificers, Repairs, &c. ..	150	- -			
Museum	50	- -			
Gold Medal	12	- -			
Library and Topographical Departments	250	- -			
Advertisements	160	- -			
Printing Circulars & Stationery	180	- -			
Maps, Diagrams, &c., for Lectures	50	- -			
Journals, including Printing Annual Report and List of Members	1,400	- -			
Postage of Journals	280	- -			
Postage	30	- -			
House Expenses and Sundries	80	- -			
Balance	243	- -			
Total	£4,731	- -	Total	£4,731	- -

LIFE SUBSCRIPTIONS AND CAPITAL ACCOUNT.

4 Life Subscriptions to the amount of £400, and £200 of "Income" (the latter to the Building Fund), have been invested in New Three per Cents., producing £589 6s. 6d., thus raising the funded property of the Institution to £17,492 5s. 8d. on the 1st January, 1887.

THE FUTURE LOCALITY OF THE INSTITUTION.

5. The Council is now in communication with the Government regarding the future locality of the Institution, but no decision has as yet been arrived at. In the meantime, they do not feel justified in incurring expenditure on the present building.

PROCEEDINGS OF THE FIFTY-SIXTH ANNIVERSARY MEETING.

PAPERS.

6. Papers on the following subjects were read and discussed during the year, viz.:—

- LIEUTENANT A. GLEN, 14th Middlesex (Inns of Court) Rifle Volunteers, on "The Transmission of Drawings by Signal."
- CAPTAIN R. H. ARMIT, 22nd Middlesex Rifle Volunteers, on "Machine Guns; their use and abuse."
- MAJOR M. T. SALE, C.M.G., R.E. (Instructor in Field Fortification, S.M.E., Chatham), on "Land Mines."
- CAPTAIN H. T. ALLATT, Duke of Cornwall's Light Infantry (Instructor in Fortification, Royal Military College, Sandhurst), on "The use of Pigeons as Messengers in War, and the Military Pigeon Systems of Europe."
- THORSTEN NORDENFELT, Esq., on "Submarine Boats."
- MAJOR C. ARUNDEL BARKER, 2nd Battalion Royal Irish Fusiliers, on "Some suggestions as to the better training of our Infantry."
- REAR-ADMIRAL the Hon. EDMUND R. FREMANTLE, C.B., C.M.G., on "Naval Tactics."
- LIEUT.-GENERAL SIR GERALD GRAHAM, V.C., G.C.M.G., K.C.B., on "Infantry Fire Tactics, and Attack Formations."
- MR. H. G. HUNTINGTON, U.S.A., on "Aids to Navigation, stationary and floating lights, &c."
- COLONEL J. B. RICHARDSON, R.A. (Chief Instructor School of Gunnery, Woolwich), on "The 'Weldon' Range-finder."
- MR. ARNULPH MALLOCK, C.E., on "The 'Mallock' Range-finder."
- MAJOR E. G. ARMSTRONG, on "The Remington Lee magazine Rifle."
- MR. W. H. REYNOLDS (the Late), on the "Application of the system of Electric Fire to Small Arms."
- MR. PAULSON, on "Paulson's electrical, automatic, locomotive Torpedo."
- LIEUTENANT WILLIAM C. CRUTCHLEY, R.N.R., on "The offensive and defensive powers of Merchant Steamers."
- MAJOR CHARLES F. C. BERESFORD, R.E., on "The Field-telegraph; its uses in war, and its employment in the late expeditions in the Soudan and South Africa."
- MAJOR H. ELSDALE, R.E., on "The Defence of London and of England." Part I.—"The Security of London against a *coup de main*." Part II.—"The Successive Stages of the Defence."
- REAR-ADMIRAL W. ARTHUR, C.B. (The Late), on "The Defence of the Coasts and Harbours of England, Ireland, and Scotland in case of War."
- CAPTAIN J. C. R. COLOMB, late R.M.A., M.P., on "Imperial Federation, Naval and Military."
- MAJOR E. T. H. HUTTON, King's Royal Rifles (late Commanding Mounted Infantry in Egypt), on "Mounted Infantry."
- MAJOR A. D. ANDERSON, R.H.A., on "The Necessity for a partial enforcement of the Ballot for the Militia, and its bearing on the Regular Army, the Yeomanry, and the Volunteers."
- COLONEL F. G. RAVENHILL, R.A. (Inspector and Purchaser of Horses, R.A.), on "A Reserve of War Horses."
- COLONEL H. T. ARBUTHNOT, R.A. (Superintendent Royal Small Arms Factory, Enfield), on "The new military Rifle and its comparison with other military Rifles, English and Foreign."
- COLONEL C. E. STEWART, C.B., C.M.G., C.I.E., Bengal Staff Corps, on "The Use of Petroleum as Fuel in Steam Ships and Locomotives, based on its employment in that way on the Caspian Sea and in the Transcaspian Region."
- COLONEL SIR CHARLES H. NUGENT, K.C.B., late R.E., on "Imperial Federation."
- MAJOR H. E. C. KITCHENER, Duke of Cornwall's Light Infantry, on "Revolve's and their use."
- CAPTAIN S. PASFIELD OLIVER, F.S.A., F.R.G.S., late R.A., on "Recent French Operations on the Coast of Madagascar, 1882-1885."
- COLONEL H. SCHAW, R.E., on "Coast Defence."

The thanks of the Institution are due to the authors of the above papers for the valuable professional information thus afforded

THE JOURNAL.

7. The sale of the Journal produced £456 5s. 6d. as compared with £432 7s. 11d. in the previous year. An Index of Subjects and Authors in volumes XX.-XXX. of the Journal will be issued this year.

LIBRARY.

8. The Library now contains 21,778 volumes, of which Four hundred and eight have been added since the last Report; of these, one hundred and eighty-nine have been purchased, one hundred and twenty-two presented, and the remainder are bound periodicals, &c.

Donations of books and maps have been received from the Governments of Austria, Brazil, Denmark, France, Germany, Italy, the Netherlands, Russia, Spain, Sweden, Switzerland and the United States.

The thanks of the Council have been conveyed to the several Governments for these donations.

The Institution is indebted to the Lords Commissioners of the Admiralty, and to the Secretaries of State for War and India, for copies of various works issued by their departments.

The exchange of Journals with Foreign Governments and with many Scientific Societies, in this and other countries, has been continued.

MUSEUM.

9. An interesting addition has been made to the Museum by the loan of 26 Portrait Figures of Officers, N.-C. Officers and Men of the Native Armies of India, from the late Indian and Colonial Exhibition at South Kensington.

A list of the other additions to the Museum and to the Library will be found in the "Proceedings" of this day's meeting, and in the Appendix to Vol. XXX. of the Journal.

VICE-PATRONS.

10. The Council record with deep regret the deaths of the following distinguished Vice-Patrons, viz.: Field Marshals Sir Richard Dacres, G.C.B., R.A., and the Rt. Hon. Sir John Michel, G.C.B.

Sir Richard Dacres joined the Institution in 1857, and was elected a Vice-Patron last year, on attaining the rank of Field Marshal.

Sir John Michel became a Member in 1854, and was also elected a Vice-Patron on attaining the same rank.

The Council have had the pleasure of electing Field Marshals Sir Patrick Grant, G.C.B., G.C.S.I., Governor of Chelsea Hospital, and the Rt. Hon. Lord William Paulet, G.C.B., Vice-Patrons of the Institution.

VICE-PRESIDENTS.

11. The Council regret to record the death of Colonel Lord Waveney, A.D.C., F.R.S., who had been for many years a Member of the Institution, and as a Member of Council and Vice-President took part in the management of its affairs; His Lordship was much interested in all questions connected with the Reserve Forces, and frequently took part in the proceedings in the Theatre of the Institution.

The Council have had the pleasure of electing Lieut.-Gen. Lord Chelmsford, G.C.B., a Vice-President of the Institution.

CORRESPONDING MEMBERS OF COUNCIL.

12. On the 1st January, 1887, the number of Corresponding Members of Council was 266.

GOLD MEDAL.

13. The Council regret to report that only three Essays have been received in competition for the Gold Medal, the subject being—

“Lessons to be learned from the campaigns in which British Forces have been employed since the year 1865.”

General Sir Beauchamp Walker, K.C.B., Colonel A. Montgomerie, late 20th Hussars, and Col. F. Maurice, R.A., kindly undertook the duties of referees.

Their decision will be made known to this Meeting.

The subject for the Naval Essay for this year is—

“Naval attack of a fortified harbour, an enemy’s fleet being within it; full consideration is to be given to the subject of Sub-Marine Mining.”

The competition is open to Members of the Institution, and to all who are eligible to become Members.

14. The following Members retire by seniority of service on the Council, viz. :—

Admiral of the Fleet Sir ALFRED P. RYDER, K.C.B.	Colonel Lord WILLIAM F. SEYMOUR.
Colonel LONSDALE HALE, late R.E.	Admiral Sir EDWARD G. FANSHAWE, K.C.B.
Major-General E. H. CLIVE.	Colonel MALCOLM S. GREEN, C.B.
Rear-Admiral LINDESAY BRINE.	Colonel Sir CHARLES H. NUGENT, K.C.B., late R.E.

The Council submit the names of ten Members, from which vacancies may be filled up. The first eight on the list are proposed for immediate election, viz. :—

Admiral Sir EDWARD FANSHAWE, K.C.B.	} For re-election.
Rear-Admiral LINDESAY BRINE.	
Colonel LONSDALE HALE.	} For immediate election.
Admiral the Earl of CLANWILLIAM, C.B., K.C.M.G.	
Colonel G. H. MONCRIEFF, late Scots Guards.	
Vice-Admiral Sir ANTHONY HOSKINS, K.C.B.	
Colonel D. M. HOME, Royal Horse Guards.	
Major-General Sir WILLIAM CROSSMAN, K.C.M.G., M.P., late R.E.	
Captain A. ABERCROMBIE JOPP, late R.E., Director-General, Store Department, India Office.	
Captain P. H. COLOMB, R.N.	

CONCLUSION.

In conclusion, the Council consider that, although there has been a decrease in the number of the Members, the finances of the Institution are in a sound and satisfactory condition.

WHITEHALL YARD,
17th February, 1887.

By Order,
B. BURGESS, CAPTAIN,
Secretary.

APPENDIX.—TABULAR ANALYSIS OF THE STATE OF THE INSTITUTION

Year. 1st Jan. to 31st Dec.	Annual Subs. received.	En- trance Fees.	Income (from all sources).	Life Subs. received.	Amount of Stock.	Invested in the pur- chase of Books, &c.	No. of Vols. in Library.	No. of Members on the 31st Dec.	Number of Visitors.
£	£	£	£	£	£	£			
1831	654	..	654	1,194	..	..	..	1,437	..
1832	1,146	..	1,146	973	..	..	..	2,699	..
1833	1,405	..	1,450	692	..	..	..	3,341	..
1834	1,500	..	1,549	583	1,100	..	..	3,748	13,376
1835	1,480	..	1,574	366	2,430	40	..	4,155	8,537
1836	1,570	..	1,682	330	3,747	45	..	4,069	8,521
1837	1,549	..	1,747	222	4,747	180	..	4,164	10,907
1838	1,462	..	1,634	230	5,500	246	..	4,175	15,788
1839	1,399	..	1,565	168	5,500	292	..	4,186	16,248
1840	1,363	..	1,525	198	5,500	446	5,500	4,257	17,120
1841	1,450	..	1,643	186	6,000	243	5,850	4,243	19,421
1842	1,373	..	1,565	144	6,400	373	6,450	4,127	21,552
1843	1,299	..	1,494	140	6,700	237	7,000	4,078	27,056
1844	1,274	..	1,408	112	3,000	298	7,850	3,968	22,767
1845	1,313	..	1,466	228	1,500	127	8,160	3,988	21,627
1846	1,298	..	1,456	138	1,500	74	8,410	4,031	32,885
1847	1,314	74	1,502	132	1,700	37	..	4,017	38,699
1848	1,175	57	1,375	48	1,700	85	9,641	3,947	37,140
1849	1,176	72	1,375	84	1,150	58	..	3,970	33,333
1850	1,141	106	1,294	198	600	36	..	3,998	33,773
1851	1,136	131	1,292	66	666	34	10,150	3,188	52,173
1852	1,134	133	1,281	114	200	43	10,300	3,078	20,609
1853	1,243	319	1,684	264	528	41	10,420	3,251	25,952
1854	1,200	138	1,368	126	612	95	10,587	3,171	22,661
1855	1,159	107	1,289	120	653	55	10,780	3,131	14,778
1856	1,216	197	1,519	156	761	47	10,832	3,201	16,184
1857	1,258	176	1,937	78	1,038	40	10,960	3,168	12,755
1858	1,318	221	2,102	105	438	31	11,062	3,246	25,747
1859	1,526	195	2,277	512	946	70	11,320	3,344	28,739
1860	1,961	298	3,577	397	2,178	114	11,517	3,518	28,011
1861	2,122	305	2,899	266	2,846	99	11,812	3,689	23,296
1862	2,296	242	3,127	239	3,178	109	12,026	3,797	27,215
1863	2,379	218	3,100	405	3,583	143	12,296	3,847	18,150
1864	2,425	215	3,253	222	4,516	116	12,700	3,902	17,273
1865	2,435	154	3,467	235	4,804	137	13,000	3,895	18,258
1866	2,435	157	3,488	299	5,486	150	13,337	3,891	17,067
1867	2,431	141	3,467	208	5,732	140	12,690	3,823	17,211
1868	2,446	184	3,534	297	6,396	119	14,100	3,812	16,417
1869	2,368	165	3,485	238	6,653	232	14,669	3,792	15,947
1870	2,376	178	3,493	333	7,313	140	15,055	3,831	18,654
1871	2,455	237	3,677	538	7,748	202	15,501	3,922	19,420
1872	2,620	336	4,111	713	8,927	192	15,761	4,116	19,773
1873	2,776	295	4,316	535	9,465	222	16,227	4,276	18,183
1874	2,819	216	4,491	409	10,189	218	16,624	4,330	16,771
1875	2,801	154	4,595*	469	10,721	228	17,000	4,308	15,960
1876	2,794	162	4,500	437	11,305	171	17,700	4,320	15,543
1877	2,840	218	4,750	526	11,725	217	18,300	4,405	15,682
1878	2,881	231	4,700	459	12,091	231	18,750	4,485	17,881
1879	2,904	180	4,490	407	12,505	254	19,170	4,473	15,529
1880	2,962	255	5,115*	577	12,965	240	19,565	4,531	13,041
1881	2,893	238	4,967	645	13,670	240	19,920	4,577	12,507
1882	2,829	181	4,739	491	14,069	174	20,352	4,591	12,546
1883	2,892	205	5,023	692	15,251	157	20,658	4,627	11,482
1884	2,851	172	4,950	491	16,000	207	20,943	4,613	12,388
1885	2,857	181	5,121	545	16,902	169	21,370	4,377	12,220
1886	2,757	141	4,842	358	17,492	192	21,778	4,368	12,358

* A legacy of £100 was received this year.

Colonel The Rt. Hon. J. H. MACDONALD, C.B., M.P. :—

Lord Harris and Gentlemen,—I have been asked to move this Resolution—
“That the Report now read be adopted and printed for circulation among the Members.” I move accordingly.

The Resolution having been seconded by Major-General Sir William Crossman, M.P., was then put from the Chair and was carried unanimously.

III.—Lt.-General LOTHIAN NICHOLSON, C.B., R.E. :—

My Lords and Gentlemen,—I have been asked to propose the second Resolution, to the following effect :—“That the thanks of this Meeting be given to the Members of the Council who retire by rotation, and that the following Members be elected to fill the vacancies, viz. :—

Admiral Sir EDWARD FANSHAWE, K.C.B.

Rear-Admiral LINDESEY BRINE.

Colonel LONSDALE HALE.

Admiral the EARL OF CLANWILLIAM, K.C.M.G., C.B.

Col. G. A. MONCRIEFF (late Scots Guards).

Vice-Admiral Sir ANTHONY HOSKINS, K.C.B.

Colonel D. M. HOME (Royal Horse Guards).

Maj.-Gen. Sir WM. CROSSMAN, K.C.M.G., M.P., late R.E.

} For Re-Election.

} For
Immediate
Election.

Also that the following names of Members be adopted from which to select in case of vacancies occurring in the Council, viz. :—

Captain A. ABERCROMBIE JOFF (late R.E.), Director-General Store Department, India Office.

Captain P. H. COLOMB, R.N.

The Resolution having been seconded by the Rev. Mr. HALPIN, late Chaplain to the Forces, was put from the Chair and was carried unanimously.

IV.—Admiral Sir ERASMUS OMMANNEY :—

The motion I have to submit for your acceptance is one which I am sure will commend itself to your grateful recognition. It is the re-election of the Auditors who have taken so much pains and care in auditing our accounts, the state of which, as we have heard in the Report, is in the main so satisfactory. The high standing and professional ability of these gentlemen needs no comment from me. I am sure we are exceedingly favoured in having gentlemen of that class who take so much care and diligence with our accounts. I therefore beg leave to propose—“That the thanks of this Meeting be given to the Auditors, Lionel Charles Drummond, Esq., and Lieut.-Colonel Wethered, for their valuable services; that the latter gentleman, who goes out by rotation, be re-elected; and that the following be the Auditors for the ensuing year:—E. R. Raitt, Esq., Lionel C. Drummond, Esq., and Lieut.-Colonel Wethered.”

The Resolution having been seconded by Capt. Jopp, late R. E., was put from the Chair and was carried unanimously.

V.—The Report of the Referees having been read by the Secretary, it was found that the winner of the Gold Medal was Captain C. E. CALLWELL, R.A.

VI.—Admiral Sir E. FANSHAWE, K.C.B. :—

The next Resolution is—“That the thanks of this Meeting be given to the Referees, General Sir Beauchamp Walker, K.C.B., Colonel A. Montgomerie, late 20th Hussars, and Colonel F. Maurice, R.A., for their valuable services in adjudicating on the Military Prize Essays.” The words “valuable services” are never better applied than on such occasions as the adjudication of these Medals. The Council, and I am sure every one else, must be fully convinced of the extreme importance of bestowing due care upon the adjudication of the Gold Medal of this Institution.

In this particular case there happen to have been only three Essays, therefore the amount of reading was not so much as it is when there are many; but still the care required is the same. There is also another consideration which was referred to in the Report of the Referees, which is the consideration whether the Essay that is selected by them as the best is of a sufficient standard to deserve the Gold Medal of the Institution. I am delighted to see that on this occasion the Referees have found it so; but I call your attention to that as showing that the Referees have fulfilled an office requiring the greatest care as well as judgment in deciding upon the various Essays forwarded for competition. I beg to move this Resolution, that a vote of thanks be given to the Referees for their valuable services.

The Resolution having been seconded by Major-General COOKE, C.B., was carried unanimously.

General Sir BEAUCHAMP WALKER, K.C.B.:—

I cannot acknowledge this vote of thanks without expressing the regret of my colleagues and myself that this very excellent subject only produced three Essays. I must say we were very much surprised at finding that there were so few to be adjudicated upon; and though that fact lightened our labours very considerably, it was to us a subject of great regret, and I am sure will be so also to you.

The Chairman having announced that the business of the Meeting was concluded, vacated the Chair, which was taken by Sir Edward Fanshawe, the Chairman of the Council.

Lt.-General LORD CHELMSFORD, G.C.B.:—

I beg to propose the following Resolution—"That the thanks of this Meeting be given to Lord Harris for having taken the Chair this day." I am sure we all feel extremely grateful to him that at the last moment he should have taken the place of the Rt. Hon. the Secretary of State for War, whom we should have been glad to have seen here; but, failing him, we could not have had a better substitute than the Under Secretary of State. The Council, and all the Members of this Institution, attach very great importance to the support of the Admiralty and War Office for this Institution, and it is a proud thing to say that we have invariably obtained the confidence of those Departments, and that at every Annual Meeting, I believe for many years past, we have had one or other Secretary of State to preside over us. At this moment we are in a critical position, and we look more than ever to the support of the Admiralty and War Office to help us in our appeal to the Treasury for assistance when we have to move from this house; I believe I am not saying more than is absolutely the truth, when I say that both the Admiralty and War Office will do all they can to assist us in this matter.

General ERSKINE:—

Mr. Chairman and Gentlemen,—I have great pleasure in seconding the Resolution which has been moved so ably by Lord Chelmsford. After what he has said, I need not trouble you with any remarks.

The Resolution was then put and carried with acclamation.

Lord HARRIS:—

Sir Edward Fanshawe, my Lords, and Gentlemen,—I imagine that no one more than myself regrets the absence of my Right Honourable friend Mr. Stanhope upon this occasion, if for no other reason, that his greater experience of this Institution, and the opportunities he has had of taking a greater interest in it during the longer course of his official life, would have rendered his presence here naturally more grateful than my own; and also on his own account I regret it, as I am sure you do, because I know it was with feelings of great disappointment he found that at the last moment the press of business was so great, that it was impossible for him to accept the invitation you had extended to him. I have understood, not only

from what has been alluded to by Lord Chelmsford, that the position of this Institution is a subject of some anxiety at this moment to its Members, and that you are looking to the Government for some signs of interest, and of material interest, in order that an Institution of such eminent value as this undoubtedly is, should maintain that position which it has held for so many years past in the eyes of the Public. I must confess from my own point of view I think that these expectations have some right to meet with material realization. Not that I have any reason to say that I have heard any mention of their being gratified; I am only expressing my own personal opinion, that an Institution of this kind does deserve some meed of State assistance. I may further say that, if it should lay in my weak power at any time to assist the Institution by strengthening its position in the opinion of the Government, I should be only too proud if that opportunity were given me. The mere perusal of the list of subjects dealt with during the year, is sufficient to show any one, that the services that this Institution gives to the country are invaluable. When we remember the extraordinary changes that have taken place in this last generation in military *matériel*, it is obvious that a full and free discussion upon all the points that are exercising the minds of both military and naval experts at this time, is absolutely necessary before the Government is approached with the object of obtaining the means to carry out those views. My experience of official life is very short, and therefore I feel that I am presumptuous in saying what I do, and I say it with the greatest diffidence; but I am convinced of this, that it is absolutely necessary that, whenever military or naval experts are convinced that a change as to *matériel* or tactics is desirable, they should go to the Government with their minds made up as to what the course of action is to be—there must be no doubt or hesitation in the minds of the military and naval experts who are to advise the political representatives of the two Services. That is the most important point, I think, about this Institution—that it affords the means of threshing out every subject of analytical discussion, and I believe in the end, in all probability, those who have to advise the Secretary of State and the First Lord of the Admiralty are able to do so with decision, and to extend that decision to the minds of their political representatives. I observe also that the Library, which had grown to considerable dimensions, has been considerably extended during this last year, that donations of books come from all parts of the world, and that an exchange of Journals goes on with various Governments and Scientific Societies. That must be assuredly a great advantage not only to this Institution, not only to the Members of the two Services, but also to the State, that that exchange of information should take place, that we should be able to take advantage of the advance of science in foreign countries, and that our Services may be benefited thereby. On that account also, it seems to me you have fair ground for going to the Government with an application for some State aid. As I said just now, when one remembers the extraordinary advance that has taken place in military *matériel* during the last 25 years, that practically the science of Artillery—I am speaking with the greatest diffidence—has practically been born again since the Crimean War; that the vast subject of Torpedo Defence has to be taken up and threshed out; that the great economic question of a horse supply; the vast question of dealing fairly with our Volunteers—all subjects which, if not raised directly, are raised indirectly in the papers that are discussed here—bearing all that in mind, it does seem to me that this Institution is one which deserves some consideration from the State; and for these reasons, if it lies at any time in my power to render it any assistance, I can assure the Members that they may depend upon my doing so. I have to congratulate this Institution on other grounds. I believe that although there has been a slight falling off in the number of Members, that that is very slight indeed, only amounting to nine; and although the amount of Subscriptions that has been received during these eight or nine years does show from 1880 a slight falling off, still the decrease is very small, and not anything like the proportion in which the incomes of other Societies and of individuals have fallen off during these last seven or eight disastrous years. On this ground I think the Institution is to be congratulated. I need not detain you, my Lords and Gentlemen, any longer, further than to thank you for the honour you have done me by allowing me to take the Chair to-day.

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